ENVIRONMENTAL ASSESSMENT, FINDING OF NO SIGNIFICANT IMPACT, AND RECORD OF DECISION

for

PREDATOR DAMAGE MANAGEMENT IN NEW MEXICO

Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

in cooperation with:

NEW MEXICO DEPARTMENT OF AGRICULTURE

and

NEW MEXICO DEPARTMENT OF GAME AND FISH

JANUARY 2006

PREDECISION

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ACRONYMS USED

APHIS	Animal and Plant Health Inspection Service
AUM	Animal Unit Month
AWP	Annual Work Plan
BISON-M	Biota Information System of New Mexico
BLM	Bureau of Land Management
BO	Biological Opinion
CEQ	Council on Environmental Quality
CFR	Codes of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FY	Fiscal Year
IWDM	Integrated Wildlife Damage Management
JPA	Joint Powers Agreement
LPC	Livestock Protection Collar
LRMP	Land and Resource Management Plan
MIS	Management Information System
MOU	Memorandum of Understanding
NASS	National Agriculture Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historical Preservation Act
NMAC	New Mexico Administrative Codes
NMDA	New Mexico Department of Agriculture
NMDGF	New Mexico Department of Game and Fish
NMSA	New Mexico Statutes Annotated
PDM	Predator Damage Management
RMP	Resource Management Plan
SMA	Special Management Area
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USC	U.S. Codes
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WA	Wilderness Area
WDM	Wildlife Damage Management
WS	Wildlife Services
WSA	Wilderness Study Area

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

While wildlife including mammalian predators is a valuable natural resource, some species of wildlife can cause problems with human interests. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program has personnel with expertise to respond to damage caused by wildlife, including mammalian predators. Most predators from the order Carnivora and the Virginia opossum (*Didelphis virginianus*) are part of New Mexico's wildlife heritage including 21 native species and 4 introduced/feral species that cause most all of the wildlife damage to resources in New Mexico. WS conducts predator damage management (PDM) for many of these species. The species in New Mexico that cause frequent damage to agricultural and natural resources, property, or threaten human health and safety include coyotes (*Canis latrans*), striped skunks (*Mephitis mephitis)*, bobcats (*Lynx rufus*), cougars[1] (*Felis concolor*), black bears (*Ursus americanus*), feral/free roaming cats (*Felis domesticus*), feral/free roaming dogs (*Canis familiaris*), and raccoons (*Procyon lotor*). Other predators in New Mexico that have historically caused only localized damage annually to occasionally, at least once in the last 10 federal fiscal years (FY95-FY04 - ie., FY04 = Oct. 1, 2003 - Sept. 30, 2004), include the Virginia opossum (introduced), gray fox *(Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), kit fox (*V. macrotis*), swift fox (*V. velox*), ringtails (*Bassariscus astutus*), badgers (*Taxidea taxus*), long-tailed weasels (*M. frenata*), feral domestic ferrets (*M. putorius furo*), western spotted skunks (*S. gracilis*), hooded skunks (*Mephitis macroura*), and hog-nosed skunks (*Conepatus mesoleucus*) and WS could provide PDM operational or technical assistance for them. In addition, New Mexico has a few other predators that could invoke complaints, but have not been received in the last 10 FYs and include eastern spotted skunks (*Spilogale putorius*), marten[2], mink (*Mustela vison*), ermine (*M. erminea*), and white-nosed coati (*Nasua narica*).

Several other species of mammalian predators are or potentially could be found in New Mexico and include species listed as sensitive, or threatened and endangered (T&E). These species could possibly be encountered during PDM activities targeting the predator species given above or could be a problem themselves. The Mexican gray wolf, the native population endangered believed to be extirpated in New Mexico, has been reintroduced in western New Mexico and eastern Arizona as a nonessential/experimental population. The Canada lynx was never documented in New Mexico, but has shown up in northern New Mexico from recent reintroduction efforts in Colorado; some of these have been killed by landowners protecting their livestock. The jaguar, though few records existed for New Mexico, has recently been photographed in the Peloncio Mountains of southwestern New Mexico. Another species believed to be extirpated, the black-footed ferret, could potentially be reintroduced from captive ferret populations; plans have been made to release them on a private ranch where they would be endangered. PDM could be initiated to target these species for problems associated with them, realistically not black-footed ferrets since this species is not likely to ever cause damage problems, but would be covered in other NEPA documentation pursuant to this EA.

The New Mexico Department of Game and Fish (NMDGF) manages the above species populations with the

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1 The New Mexico Department of Fish and Game's regulations refer to mountain lions as cougars and thus this name will be used throughout the document, but are interchangeable.

2 Sensitive, threatened, and endangered species scientific names given in Table 5.

exception of coyotes, skunks, opossum, feral domestic pets, and T&E species. The species NMDGF manage are classified as game animals or furbearers under New Mexico statutes. Game animals include the black bear and cougar and furbearers include the mink, weasel, otter, ringtail cat, raccoon, marten, coati, badger, bobcat, red fox, gray fox, kit fox, and swift fox. Coyotes, skunks, and opossum are unprotected in New Mexico, and coyotes and skunks, and their damage are the responsibility of NMDGF and the New Mexico Department of Agriculture (NMDA). By statute, NMDGF has the responsibility to manage predator damage, including coyote predation, to other wildlife. NMDA, has responsibility under New Mexico statutes to manage damage to agricultural and rangeland resources from predatory animals. Feral dogs, feral cats, and feral domestic ferrets are the responsibility of County and municipal Animal Control Offices or the County Sheriff Departments. And lastly, T&E species are managed by the U.S. Fish and Wildlife Service (USFWS), but management of these species can be deferred to NMDGF under agreement.

Under State law, NMDGF must respond to complaints from private landowners or lessees when protected wildlife, including game and furbearers that are causing damage. WS, under a Joint Powers Agreement (JPA) and contract, assists NMDGF with responding to these complaints. WS, under a Memorandums of Understanding (MOU) with NMDA, also responds to agricultural and rangeland resource damage from predators. WS also assists public entities, such as USFWS, and Tribes with PDM when requested and when they have the appropriate permits necessary from NMDGF, as required. Coyotes, skunks, and opossum are not protected by NMDGF and are considered predatory animals; their damages to agricultural and rangeland resources are managed by NMDA, and WS under the MOU responds to requests for assistance. Landowners also have the right to protect their resources from unprotected predatory animals without a permit.

The following document is an environmental assessment (EA) that describes and analyzes WS's involvement in PDM in New Mexico. For the purposes of this EA, predatory mammals are defined as those species listed in the first paragraph of the EA. While NMDGF is clearly responsible for over half of these species' populations (14) and much of their damage, WS assists them with PDM. WS also assists NMDA, Tribes, other federal agencies, and public entities with PDM. Therefore, WS is providing the following analysis to determine if WS has any significant impacts on these species or the human environment as a result of conducting PDM. This EA will be used in a decision-making process to determine if WS should continue to provide this service. Although WS has federal authority to conduct wildlife damage management, WS also has a policy of abiding by state laws and has agreed to be consistent with any management direction or plans that NMDGF or NMDA establishes on behalf of the State. NMDGF is mandated under State law to carry out PDM for game and furbearers which includes most of the above species. Therefore, whether or not WS conducts PDM, actions would be taken to reduce damage from these species. Thus, WS cannot, for the most part, affect protected predatory animals species' abundance.

1.1.1 Background

Across the United States, wildlife habitat has substantially changed as human populations have expanded and land has been transformed to meet varying human needs. These changes often compete with wildlife and have inherently increased the potential for conflicts between wildlife and people. Some species of wildlife have adapted to and thrive in the presence of humans and the changes that have been made. These species, in particular, are often responsible for the majority of conflicting activities between humans and wildlife. The programmatic USDA-APHIS-WS Final Environmental Impact Statement (EIS) and Record of Decision (hereinafter referred to as USDA 1997) summarized the relationship in American culture of wildlife values and wildlife damage in this way:

"Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife generally is regarded as providing economic, recreational and aesthetic benefits . . . , and the mere knowledge that wildlife exists is a positive benefit to many people. However, . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and values is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural, and economic considerations as well."

USDA is directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for WS is the Animal Damage Control Act of 1931 (7 U.S. Codes (USC) 426-426c; 46 Stat. 1468), as amended in the FY01 Agriculture Appropriations Bill, which is given in Section 1.6.1.

Wildlife damage management (WDM), or control, is defined as the alleviation of damage or other problems caused by wildlife (Leopold 1933, Wildlife Society 1990, Berryman 1991). WS uses an Integrated WDM (IWDM) approach as defined in USDA (1997). This includes nonlethal strategies such as the modification of the habitat or offending animal's (s') behavior, and control of the offending animal(s) or local population of the offending species with lethal or nonlethal methods (USDA 1997). The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) authorize agencies to eliminate repetitive discussions of issues addressed in a programmatic EIS by tiering to the broader document (CFR (Code of Federal Regulations) 1500.4(I); 1502.20). Thus, this EA incorporates relevant discussions and analysis from USDA (1997) and includes discussions of the methods specifically used by WS in New Mexico. USDA (1997) may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

WS's mission, developed through a strategic planning process (APHIS 2004), is to *"... provide Federal leadership in managing problems caused by wildlife. WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can damage agricultural and industrial resources, pose risks to human health and safety, and affect other natural resources. The WS program carries out the Federal responsibility for helping to solve problems that occur when human activity and wildlife are in conflict with one another."* This is accomplished through:

- training of wildlife damage management professionals;
- development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
- the collection, evaluation, and dissemination of management information;
- cooperative wildlife damage management programs;
- informing and educating the public on how to reduce wildlife damage; and
- providing technical advice and a source for limited-use management materials and equipment such as cage traps.

WS' Policy Manual[3] reflects this mission and provides guidance for engaging in wildlife damage control activities. WS personnel abide by the WS mission and policies. WS cooperates with land and wildlife management agencies, when appropriate and as requested, to combine efforts to effectively and efficiently resolve wildlife damage problems in compliance with all applicable federal, state, and local laws and MOUs between WS and other agencies. Before wildlife damage management is conducted, *Agreements for Control* or *WS Work Plans* must be executed by WS and the land owner/administrator/agency representative. At the State level, WS has current MOUs, JPA, or similar documents with NMDA and NMDGF that specify roles and functions. The JPA with NMDGF specifically addresses which agency is responsible for the different species causing damage. National level MOUs have been signed between WS the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) that transferred the responsibilities for PDM and related compliance with NEPA from BLM and USFS to WS when WS is conducting PDM in response to requests from permittees on their lands, as appropriate.

1.1.2 The New Mexico WS Program

WS is a cooperatively funded, service-oriented program that responds to wildlife damage complaints from cooperators ranging from private citizens to other agencies. The biggest portion of the WS program in New Mexico is to resolve conflicts between coyotes and livestock and is reflected in the number of requests that WS receives. WS has received requests for assistance for damage caused by 17 predators from FY98 to FY04 (Table 1) with the coyote being responsible for the majority. WS has not received a request for assistance for the other 8 species covered in this EA in the past 7 FYs; however, the need could arise to assist with management projects for these species.

WS works mostly in response to requests from the public, but conducts some PDM for agencies. Under the MOU with NMDA, WS responds to damage from predators involving agricultural and rangeland resources. WS refers complaints involving resources other than agriculture and rangeland being damaged by furbearers and game animals from the public to NMDGF because they first must obtain a depredation complaint or permit number for a problem to be resolved. WS is routinely requested by NMDGF to assist with specific PDM projects throughout much of New Mexico where predators are damaging resources that NMDGF is responsible for protecting. Under the JPA between NMDGF and WS, WS provides assistance to NMDGF. WS can provide public entities with PDM such as counties and USFWS. NMDGF does not have to respond to complaints from these entities, except NMDGF still must be contacted for a depredation complaint or permit number when protected predators are causing damage to specific resources. In addition, Tribes are responsible for wildlife management on their own properties and can request assistance from WS, but do not have to go through NMDGF to resolve predator problems.

WS receives requests for PDM throughout New Mexico. New Mexico encompasses 121,598 mi^2 in 33 Counties (Figure 1): Bernalillo, Catron, Chaves, Cibola, Colfax, Curry, De Baca, Dona Ana, Eddy, Grant, Guadalupe, Harding, Hidalgo, Lea, Lincoln, Los Alamos, Luna, McKinley, Mora, Otero, Quay, Rio Arriba, Roosevelt, Sandoval, San Juan, San Miguel, Santa Fe, Taos, Sierra, Socorro, Torrance, Union and Valencia. The State is divided into 3 WS Districts: Albuquerque, Las Cruces, and Roswell. WS personnel receive requests to conduct PDM throughout the various counties and Districts on private, federal, state, Tribal, county, and municipal lands. New Mexico consists of 43% private, 17% BLM, 12% USFS, 12% State, 9%

3 **WS Policy Manual** - Provides guidance for WS personnel to conduct wildlife damage management activities through Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Section.

Tribal, and 7% other lands. As of the end of January 1, 2003, WS's MIS [4] had active cooperative agreements in place on approximately 24.8 million acres, about 32% of the State's total acreage. The majority of property under agreement for PDM is privately owned (56%). Lands under agreement as of January 1, 2003 were 13.9 million acres of private lands, 6.7 million acres of BLM administered lands, 2.9 million acres of State lands, 0.9 million acres of USFS lands, and less than 0.4 million acres of other lands (military, Tribal, Bureau of Reclamation, county, and city).

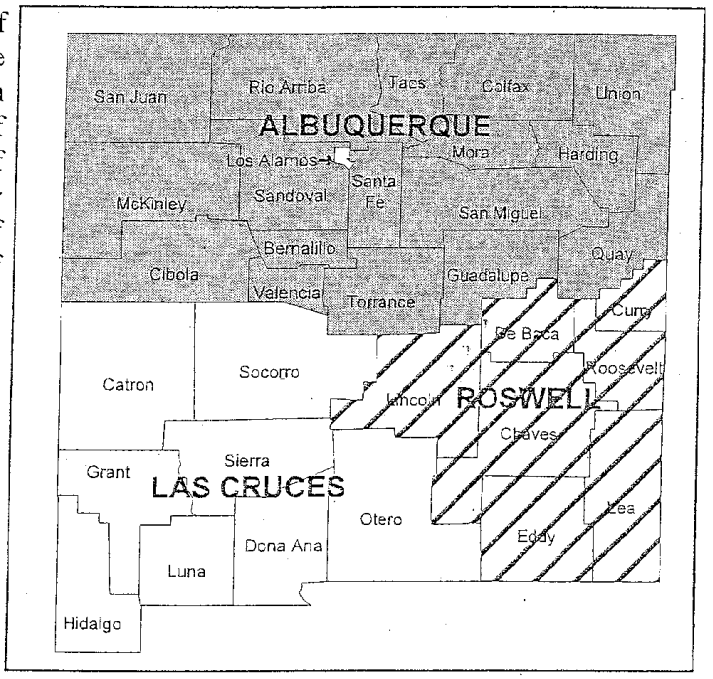

Figure 1. WS in New Mexico has three Districts (Albuquerque, Las Cruces, and Roswell) that have personnel to respond to mammalian predator damage complaints in New Mexico's 33 Counties.

Even though agreements are in place for 32% of the lands in New Mexico, WS typically does not conduct PDM activities on every property under agreement each year. For example in FY02 and FY03, WS took target predators for PDM on properties totaling 11.2 and 11.3 million acres or about 14% of the lands in New Mexico. WS also does not work continuously throughout the year on these properties and typically spends only a few hours or days on any specific property during the year resolving damage problems. Additionally, WS PDM is typically conducted on only a small portion of a property under an agreement; as part of an analysis by WS, it was determined that work was actually only conducted on about 2% of the lands in a District (WS 1997a, b, c) because WS only worked on portions of properties (i.e., 1,000 acres of *property X* was worked vs. 30,000 acres covered by the agreement). Therefore, WS PDM actions only occur on a small fraction of the land area in the State and would therefore impact only a small proportion of the predator populations. Information on agreement acreage as well as predators taken and other information is kept in a management information system (MIS[4]).

1.2 PURPOSE

This EA evaluates a portion of WS's responsibility to protect resources in New Mexico. Specifically, this EA addresses mammalian PDM for the protection of a variety of resources throughout New Mexico; predators include a range of species that prey on livestock and wildlife, damage property and other resources, or threaten human health and safety.

WS has a JPA with NMDGF and MOU with NMDA that outline the cooperative relationship between these

4 MIS - Computer-based Management Information System used by WS for tracking Program activities. WS in New Mexico has had the current MIS system operational since FY94. Throughout the text, data will be given for a federal fiscal year such as FY04, when the data was entered into the MIS. MIS reports though will not be referenced in the Literature Cited Section since most reports from the MIS are not kept on file. A database is kept that allows queries to be made to retrieve the information needed.

agencies and WS, and the responsibilities for each agency when responding to PDM requests for the different species they manage. Feral dogs, cats and ferrets are managed under the authority of county and municipal laws and WS responds to complaints involving them only at the request of the appropriate Animal Control Office, County Sheriff, Health Department, or managing agency; if the agency wants assistance with a problem, WS gets an agreement or some of approval to conduct PDM, at that time. WS refers complaints involving T&E species to USFWS, unless directed otherwise in an MOU; none of the predators covered under this EA are T&E species, but WS, under the direction and guidance of USFWS, may respond to complaints involving these species under provisions of the Endangered Species Act (ESA) and NEPA documentation pursuant to this.

The analysis in this EA includes an effort to consider existing data contained in other NEPA and related documents. WS completed three PDM EAs in 1997 (WS 1997a, b, c) for each District in New Mexico. WS has also completed monitoring reports on these annually to determine if the work being conducted remained in the scope of the EA. If new issues arose or the analysis in the monitoring reports concluded that WS PDM activities were outside the scope of the EAs, the EAs were supplemented to include the new information and sent out for public review. New Findings of No Significant Impact (FONSIs), as appropriate, and Records of Decisions (RODs)were then released as was done in 2001 for the EAs (WS 2001a, b, c). The data from the monitoring reports and new FONSIs/RODs are used and referenced in this EA. This EA is an effort to combine the 3 EAs into one comprehensive statewide EA to provide a more uniform approach for PDM throughout the State. It has been found in other State WS Programs that a comprehensive EA has provided a more usable working tool for coordination with all cooperating agencies and promotes consistency in PDM activities by WS throughout the State (WS 1999a). In addition to incorporating the WS PDM EAs for New Mexico (WS 1997a, b, c), this EA is tiered to USDA (1997).

Normally, according to the APHIS procedures for implementing NEPA, individual wildlife damage management actions are categorically excluded (7 CFR 372.5(c), 60 Fed. Reg. 6,000-6,003, 1995). However, this EA was prepared to facilitate planning, interagency coordination, and streamline management, and to clearly communicate with the public the analysis of cumulative impacts. WS has previously determined that an EIS was not required (WS 1997a, b, c) and that preparation of an EA for the program on all land classes in New Mexico complies with NEPA, and with the Council on Environmental Quality (CEQ) (40 CFR 1500) and APHIS NEPA implementing regulations (7 CFR 372).

1.3 NEED FOR ACTION

PDM is conducted to protect agricultural and natural resources, property, and human health and safety from predators. PDM has been conducted since the 1920s in New Mexico by WS. Over the last 7 FYs (FY98 to FY04), WS has received an average of more than 860 requests from the public annually to resolve problems associated with mammalian predators (Table 1). The majority of requests (81%) are to protect agricultural resources followed by 13% of requests to protect human health and safety. Eight species create 99% of the requests for assistance including coyotes (61%), striped skunks (13%), bobcats (11%), cougars (6%), black bears (3%), feral cats (2%), feral dogs (2%), and raccoons (1%). An additional 8 species of predators in New Mexico have only been responsible for 1% of the requests for assistance during the last 7 FYs. Finally, WS has not received requests for assistance for 8 other species covered in this EA, but potentially could. However, as indicated over the last several years, these species would cause little, if any damage, and likely only a few requests for assistance in the next several years. The primary reason for covering these species in this document is that when a WS Specialist goes out to investigate a complaint, the requestor or the WS

Specialist may not know what species is responsible for the request. Upon investigation, the Specialist may be able to determine which species is responsible for the problem; in some cases, though, the Specialist may only determine that it could be, one of a few different species especially where similar species have overlapping ranges (e.g., one of the five skunk species). The Specialist could then implement PDM without conducting the additional NEPA necessary to stop or prevent damage; typically the damage would escalate seriously if the Specialist did not respond immediately (e.g., if you go to house fire, the fire usually needs to be put out immediately before it destroys additional resources).

1.3.1 Summary of Proposed Action

The proposed action is to continue the current WS PDM activities in New Mexico for the protection of livestock, crops, property, natural resources, and human health and safety as outlined in prior WS EAs (1997a, b, c, 2001a, b, c). The objective of PDM as conducted in the proposed action is to minimize loss or the risk of loss to the above resource categories from predators by responding to all public requests with technical assistance (advice or demonstrations) or direct control. WS employees provide technical assistance to resource owners covering a variety of methods that can be used to resolve problems where it is appropriate for the resource owners to resolve the problem or part of the problem themselves. WS also assists resource owners through educational programs on damage identification, prevention, and control, and by providing information on sources of supply for PDM products such as pyrotechnics and propane cannons or by temporarily lending some supplies such as cage traps.

Direct control support has been mostly provided for situations that require the use of methods and techniques that are difficult or dangerous for the public to implement, especially those that involve lethal control measures, and where WS's expertise in PDM is of value. Direct control efforts often require costly expenditures for supplies and staff hours and, therefore, is most often given where cooperative funding is available. Resource owners that are given direct PDM support are also encouraged to use additional management strategies and sound husbandry practices, when and where appropriate, to further reduce conflict situations.

Under the proposed action, IWDM would be implemented which encourages the use of all available legal techniques and methods, used singly or in combination, to meet the needs of the requesters for resolving conflicts with predators. Most wildlife damage situations require professional expertise, an organized control effort, and the use of up to several of the available PDM methods to sufficiently resolve them. WS personnel, who are trained professionals and equipped to handle most damage situations, use IWDM to be effective. The resource, species, location and the type of damage, and the available biologically sound, cost-efficient, legal IWDM methods are analyzed by WS personnel to determine the action(s) necessary to be taken to correct a conflict with a predator.

The proposed action would continue to allow the use of all legal and appropriate methods to resolve predator damage. A wide range of methods is available for resource owners and WS personnel; these are described in more detail in Chapter 3. PDM methods fall into different categories including cultural practices (i.e., shed lambing and guard animals), habitat and behavior modification (i.e., exclusion, chemical repellents, and hazing with pyrotechnics), and population management (i.e., traps, shooting, and toxicants). Population management methods used by WS personnel include shooting, calling and shooting, aerial hunting, leghold traps, cage traps, snares, M-44s, the livestock protection collar (LPC), DRC-1339, chemical immobilization and euthanasia, denning, gas cartridges, decoy and tracking dogs, and hand-capture. The population

management techniques are primarily used lethally, but are dependent on the species targeted.

PDM would be allowed in New Mexico, under the proposed action, when and where requested on private and nonprivate lands. Before PDM is conducted operationally by WS, an *Agreement for Control* must be signed by WS and the land owner or manager, or a *WS Annual Work Plan* (*AWP*) must be presented to the land management administrator or agency representative for their review. PDM as conducted by WS would comply with federal, state, Tribal and local laws and current MOUs or the JPA between WS and the various management agencies. WS personnel communicate with other agency personnel as appropriate and necessary.

The primary objective of PDM for WS in New Mexico is to respond to 100% of the requests for assistance through technical assistance or direct operational PDM. WS in New Mexico would also strive to keep lamb losses below 5%, adult sheep losses below 2%, and calf losses below 1% of the number of livestock protected, but will no longer monitor this objective. WS obtained the data necessary to track the effectiveness of WS Specialists at meeting this objective until 2001 and analyzed it in prior EAs (WS 1997a, b, c) and monitoring reports. WS almost always met the objective or was within a percentage point. However, WS will no longer obtain the data because it requires hundreds of staff hours to collect this information. Since it has been determined that WS has been mostly effective at meeting the objective, it is felt that it is no longer necessary to expend valuable resources collecting this information and has not since Calendar Year 2001.

The objective of PDM as conducted in the proposed action is to reduce loss or the risk of loss to all resource categories from predators. WS's response to requests for assistance from the public is through technical assistance (advice or demonstrations) or direct damage management. WS employees would provide technical assistance to resource owners covering a variety of methods that can be used to resolve problems and where it is appropriate for the resource owners to resolve the problem themselves. WS would also assist resource owners through educational programs on damage identification, prevention, and control, and by providing information on sources of supply for PDM activities such as pyrotechnics and propane cannons or by temporarily lending some supplies such as cage traps. Direct control support would mostly be provided for situations that require the use of methods and techniques that are difficult or dangerous for the public to implement, especially those that involve lethal PDM measures. Direct control efforts often require costly expenditures for supplies and staff hours and, therefore, is most often given where cooperative funding is available. Resource owners that are given direct PDM assistance would be encouraged to use additional management strategies and sound husbandry practices, when and where appropriate, to further reduce conflict situations.

Predators are responsible for the depredation of a wide variety of livestock, other agricultural resources, property, and natural resources. In addition, predators can be a threat to human health and safety (i.e., a person was killed by a bear in FY01). Table 1 gives the requests for assistance by category over the last 7 FYs (FY98-FY04). Requests for assistance are an indication of need, but the requests that WS receives are likely much less than the need in actuality and may vary depending on the species of predator. Requests for assistance are an indication of need, but the requests that WS receives is likely much less than the need in actuality. Connolly (1992) determined that only a fraction of the total predation attributable to coyotes is reported to or confirmed by WS. He also stated that based on scientific studies and recent livestock loss surveys generated by the National Agriculture Statistics Service (NASS), WS only confirms about 19% of the total adult sheep and 23% of the lambs actually killed by predators. WS Specialists do not attempt to

locate every livestock kill reported by ranchers, but rather make attempts to verify sufficient losses to determine if a predator problem exists that requires PDM actions. Therefore, WS's loss reports do not actually reflect the total number of livestock lost in the State, but provides an index of the annual losses. Also, some people are unaware of the WS Program and may try to resolve problems themselves or NMDGF may choose to handle certain depredation problems caused by furbearers or game animals without requesting WS assistance. The total number of requests for assistance reflected in damage occurrences have remained fairly stable since the PDM EAs were written (WS 1997a, b c).

The total value of the resources damaged can give an indication of the need for PDM, but is not always the best indicator of the overall need. The value can be variable depending on the ability of a particular predator to inflict damage and the type of resources being damaged. For example, one cougar may kill 40 sheep in just a few nights or it may kill a registered thoroughbred foal, either resulting in thousands of dollars damage for just one incident, and skew the value. However, in general, predator damage, especially for coyotes and cougars remains fairly consistent and reflects the number of livestock these species kill. Value is often more of an indicator of the focus of WS PDM because many requesters know that WS will respond to their needs for certain species; these species are outlined in MOUs and the JPA.

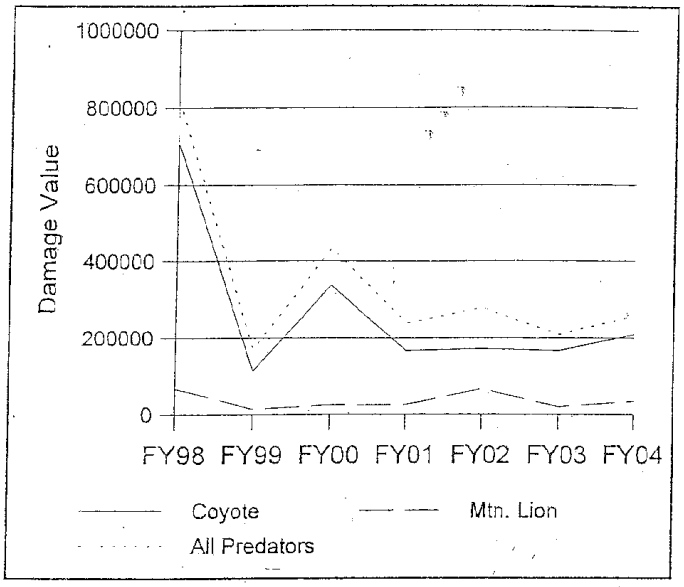

Figure 2. New Mexico WS records the value of damage from predators when responding to requests for PDM assistance. The value of damage caused by coyotes and cougars in all resource categories for FY98 to FY04 is given along with the value of damage for all predators combined which mostly reflects coyote damage.

The combined total value for damage caused by all predators has mostly reflected coyote damage followed by cougars, averaging 77% and 10% of the combined damage annually for all mammalian predators for FY98 to FY04. The value of damage caused by predators that is documented by WS is often related to the number of requests for assistance received for each species. However, the top 4 species that cause the greatest damage from a value standpoint (coyote, cougar, bobcat, and feral dog) are not the same that cause the most requests for assistance (coyote, striped skunk, bobcat, cougar) , primarily as a result of a larger species that is capable of causing valuable damage versus a smaller species that creates the most calls (cougars and dogs vs striped skunks and feral cats). Figure 2 gives the value of damage for coyotes, cougars, and damage combined for all predators in New Mexico from FY98 to FY04. Damage for coyotes has fluctuated and not shown a trend, but typically is the highest percentage of the value of damage for all mammalian predators. Cougar damage has remained relatively stable at a much lower percentage than coyotes; even though cougars only invoke the 4th highest number of complaints, they consistently rank 2nd in the value of their damage. Other than these two predators and damage from bobcats and feral dogs, damage for the remaining twenty predators in New Mexico combined is typically less than 5% of the total value of damage.

Table 1. Requests for WS PDM assistance from individuals and entities to protect different categories of resources from predators for FY98 to FY04.

DAMAGE OCCURRENCES FOR PREDATORS RECORDED BY WS FROM FY98 TO FY04																																
Resource Category	Agriculture							Property							Human Health & Safety							Natural Resources							Total							Ave.
Fiscal Year	98	99	00	01	02	03	04	98	99	00	01	02	03	04	98	99	00	01	02	03	04	98	99	00	01	02	03	04	98	99	00	01	02	03	04	
Badger	4	6	1	2	2	1	-	2	1	3	1	1	1	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	6	7	5	3	3	2	2	4
Black Bear	5	6	20	30	38	18	9	-	4	2	4	2	1	1	2	-	3	23	3	2	2	-	-	-	-	-	-	-	7	10	25	57	43	21	12	25
Bobcat	82	101	124	97	103	84	48	2	-	2	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	84	101	126	98	104	84	49	92
Feral Cat	4	1	-	1	-	-	-	-	8	1	5	3	1	3	16	15	13	15	14	10	2	-	-	-	-	-	-	-	20	24	14	21	17	11	5	16
Coyote	671	457	467	523	449	476	509	11	4	7	11	17	6	28	14	14	10	6	4	7	10	1	1	-	-	-	-	1	697	476	484	540	470	489	548	529
Feral Dog	22	15	20	13	6	9	6	-	1	-	-	-	-	-	1	2	-	2	-	1	1	-	-	-	-	-	-	-	23	18	20	15	6	10	7	14
Feral Ferret	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	0
Gray Fox	2	3	2	3	1	1	1	-	1	-	-	2	-	-	-	1	1	-	2	1	-	-	-	-	-	-	-	-	2	5	3	3	5	2	1	3
Kit Fox	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	0
Red Fox	4	3	-	1	-	-	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4	3	-	2	-	-	3	2
Cougar	32	29	61	51	46	51	60	-	1	2	3	1	-	3	2	2	1	3	-	1	2	2	1	-	1	-	1	1	36	33	64	58	47	53	66	51
Opossum	1	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	3	1	-	-	-	1
Raccoon	6	12	6	8	5	2	3	6	4	5	6	2	1	1	-	4	3	2	2	2	-	-	-	-	-	-	-	-	12	20	14	16	9	5	5	12
Ringtail	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	1	1	1	-	-	-	-	-	-	-	-	1	-	-	3	1	1	-	1
Hognosed Skunk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	0
W. Spot. Skunk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	0
Striped Skunk	13	10	9	5	2	2	-	44	49	38	28	16	15	24	96	89	99	71	72	69	43	-	-	-	-	-	-	-	153	148	146	104	90	86	67	113
Total	849	643	712	734	652	644	639	66	73	60	62	45	25	62	133	128	132	124	98	94	61	3	2	0	1	0	1	2	1,051	846	904	921	795	764	765	864
Average	696							56							110							1							864							

1.3.2 Need for Predator Damage Management for the Protection of Livestock

Predators are responsible for the depredation of a wide variety of livestock including cattle, sheep, goats, swine, exotic pen-raised game, other hoofed-stock, and poultry. Depredation is defined as the killing, injury, or harassment of livestock resulting in monetary losses to the owner. Cattle and calves are vulnerable to predation, especially at calving (NASS 1992, 1996, 2001). Sheep, goats, and poultry are highly susceptible to year-round predation (Henne 1975, Nass 1977, 1980, NASS 1991, 1995, 2000, Tigner and Larson 1977, O'Gara et al. 1983). Livestock losses cause economic hardships to their owners, and without effective PDM to protect them, typically escalate (Nass 1977, 1980, Howard and Shaw 1978, Howard and Booth 1981, O'Gara et al. 1983). Bears and cougars (Mysterud 1977, Shaw 1987) are occasionally responsible for catastrophic incidents or large losses of sheep and lambs, sometimes called "surplus killing," when only selected tissues or parts are consumed or the carcasses are not fed on at all. Bears or cougars may also frighten an entire flock of sheep as they attack, resulting in a mass stampede; this sometimes results in many animals suffocating as they pile up on top of each other in a confined area, such as along thick willow growth in the bottom of a drainage or in corrals. Over one hundred sheep have been documented to be killed by a cougar in one incident (Wade and Bowns 1982).

Of the predators that kill livestock, coyotes inflict the highest percentage of damage. Coyotes accounted for 93% of all predator-killed lambs and ewes on nine sheep bands in shed lambing operations in southern Idaho and 25% of these kills were not fed upon (Nass 1977). Coyotes were also found to be the predominant predator on sheep during a study in New Mexico; it was found during this study that more than 43% of lambs killed by coyotes were not fed upon (DeLorenzo and Howard 1977). Coyotes were also the primary predator on sheep throughout a Wyoming study and essentially the only predator in winter (Tigner and Larson 1977). Connolly (1992) determined that only a fraction of the total predation attributable to coyotes is reported to or confirmed by WS. Other predators that cause predation on cattle, calves, sheep and lambs in New Mexico are bobcats, black bears and cougars. Bears and cougars can cause substantial losses. Feral or free ranging dogs are also responsible for considerable predation on livestock and wildlife, and it is not uncommon to find multiple kills from them. Other small carnivores such as badgers, gray fox, red fox, raccoons, and striped skunks will prey on livestock but primarily young lambs, kid goats, and domestic fowl.

1.3.2.1 Contribution of Livestock to the New Mexico Economy. In 2002, agriculture generated over $1.7 billion in annual sales from farm and ranch commodities in New Mexico (NASS 2003). Of this, livestock production, primarily cattle, sheep, goats, hogs, and poultry, accounted for about 76% of total farm commodity cash receipts and is, therefore, considered a primary agricultural industry sector in the State. In 2002, the total cash value from sales of all livestock products was about $1.3 billion in New Mexico (NASS 2003). Cattle and sheep production contributes substantially to local economies as range livestock production is the leading agriculture industry in New Mexico. Production values for New Mexico in 2002 were $534 million for cattle and calves and $8 million for sheep and lambs (NASS 2003). In 2002, New Mexico livestock inventories included 1,704,000 cattle and calves, 155,000 sheep and lambs, and 19,000 goats (NASS 2003). In addition, swine, poultry, rabbits, ratites, and exotic livestock are produced in New Mexico, but at lower levels. Sheep inventories in New Mexico have declined sharply over the last 20 years from a high of 660,000 in 1980 (NASS 2003). Part of the reason is that the sheep and wool market has declined making it uneconomical to raise sheep. However, the number of AUMs (animal unit months) allotted on BLM and USFS lands has been declining in many areas of the United States and this has had a negative impact on livestock production. In Nevada, a study determined that the reduction in AUMs there had about a 9% negative economic effect annually (Pearce et al. 1999) in the 1990s.

1.3.2.2 Scope of Statewide Livestock Losses. NASS conducted comprehensive surveys of sheep lost to predators in 1994 and 1999 (NASS 1995, 2000) and cattle lost to predators in 1991 and 2000 (NASS 1992, 2001). NASS (1995) reported that predators killed 6,975 adult sheep valued at $453,375 and 18,400 lambs valued at $699,200 in the State during 1994. With sheep and lamb numbers dropping over 40% from 365,000 head in 1995 to 155,000 head in 2002 (NASS 2003), it was expected that predation would also drop. NASS (2000) reported that throughout New Mexico predators killed 2,800 adult sheep valued at $227,000 and 7,500 lambs valued at $338,000 in 1999, a correspondingly reduced number predated. Of the sheep and lambs predated, coyotes were responsible for about 46% of the predation, bobcats 22%, dogs 15%, and cougar 8%. Cattle and calf predation losses in the State totaled 2,800 head valued at $1.3 million in 1991 (NASS 1992) and 2,600 head valued at $965,000 in 1995 (NASS 1996). The number of cattle and calves, though, in the New Mexico increased from 1,500,000 in 1995 to 1,704,000 in 2002 (NASS 2003), and predation losses increased accordingly. In 2000, cattle and calf predation increased to 5,700 head valued at 2.0 million (NASS 2001). Of these, coyotes were responsible for about 75% of the losses and cougars about 15%. NASS (1992, 2001) data for New Mexico indicated predation losses for cattle and calves to be less than 100 and 1,600, respectively, in 1991 and 300 and 1,500 in 2000. The loss value was estimated at $530,000 in 1991 and $720,000 in 2000. These losses occurred in spite of PDM efforts by producers, who must bear the additional costs for these activities (Jahnke et al. 1987), and WS personnel.

WS personnel respond to reports from resource owners of losses to predators which may or not be verified. Verified losses are defined as those losses examined by an WS Specialist during a site visit and identified to have been caused by a specific predator. Confirmation of the species that caused the loss is a vital step toward establishing the need for PDM and the level necessary to resolve the problem. WS Specialists not only confirm the predators responsible for losses, but also record the extent of the damage when possible. Losses that are reported, but not confirmed, are defined as those losses reported by the resource owner to WS and not confirmed during a site visit. Livestock losses reported to WS by cooperators are recorded as confirmed losses only if WS personnel are able to visit the site and make a determination of the causative species. Losses are considered unconfirmed if confirmation of the causative species is not made. Other reported losses might involve situations where the identity of the predator species could not be determined by the WS Specialist. In New Mexico from FY01 to FY04, WS personnel responded to 721, 635, 635, and 636 complaints where reported and verified losses from predators for all classes of livestock including poultry and commercially raised game were worth about $224,000, $237,000, $204,000, and $251,000. Livestock losses in FY01 included 152 sheep, 575 lambs, 15 cows, 349 calves, 1 horse, 2 foals, 1 llama, 1 piglet, 1 rabbit, and 354 poultry. Livestock losses in FY02 included 90 sheep, 816 lambs, 6 cows, 292 calves, 34 goats and kids, 2 horses, 6 foals, 1 rabbits, 112 poultry and 25 commercial game animals. Livestock losses in FY03 included 115 sheep, 774 lambs, 8 cows, 226 calves, 23 goats and kids, 2 horses, 6 foals, 4 piglets, and 41 poultry. Losses in FY04 included 189 sheep, 810 lambs, 5 cows, 369 calves, 84 goats and kids, 3 horses, 5 foals, 3 rabbit, and 340 poultry. Of the value for the combined losses from FY01-FY04, coyotes accounted for 77%, cougars 12%, black bears 4%, bobcats 4%, feral dogs 3%, and a combined total of less than 1% for raccoons, red and gray fox, badger and striped skunks. Many of the other predators in New Mexico covered by this EA are known to predate or injure livestock, but no losses to these predators were recorded in FY01 to FY04, except that the reintroduced Mexican wolves were responsible for the loss of some livestock in New Mexico.

WS in New Mexico annually surveyed its cooperators to determine losses to predators based on the calendar year. All cooperators are surveyed, even for those that WS did not provide PDM activities. The cooperator surveys by WS were last completed for the 2001 calendar year and revealed livestock losses of $1.3 million

to predators. Table 2 displays the supplemental information for cattle, sheep, and goats lost in New Mexico to predators in 2001, the species of predator responsible for the loss, and the value of the lost resources. These figures do not represent all livestock losses which occurred as a result of predation throughout New Mexico, but rather gives accounts of cattle, sheep, and goat losses to mammalian predators on WS cooperator ranches. The predators responsible for livestock lost to predation were coyotes at 71%, cougars at 12%, bobcats at 6%, bears at 1.6%, feral dogs at 1.1%. A three year average of the value of livestock resources from 1999 through 2001 lost to predation in New Mexico, as reported to WS by resource owners, averaged about $1.5 million. It is expected that losses will continue to occur at roughly this average and that the predation percentages by the different species will remain similar. However, in the absence of PDM, losses could be expected to be much higher.

Table 2. Livestock lost to predators in New Mexico reported to WS by cooperators during the 2001 calendar year. The coyote is the species most often found to be responsible for livestock losses caused by predator activity, followed by cougars, and bobcats.

Cattle and Sheep Losses to Predators Reported by Cooperators to WS for Calendar Year 2001								
Livestock	Coyote	Cougar	Bobcat	Black Bear	Feral Dog	Badger	Total	Value
Cattle	49	9	-	2	1	-	61	$28,250
Calves	1,688	171	-	40	25	5	1,929	$843,185
Sheep	171	606	12	6	8	-	803	$68,230
Lambs	2,355	359	1,214	13	33	-	3,974	$240,463
Goats	5	-	-	-	-	-	5	$250
Kids	61	20	142	-	-	-	223	$10,015
Total	4,329	1,165	1,368	61	67	5	6,995	$1,190,393
Value	$920,895	$153,245	$78,729	$20,440	$14,334	$2,750	$1,190,393	

The loss of livestock in New Mexico, though, does not provide an estimate of the effectiveness of PDM provided by WS. The only measure of success of a PDM program is the number of livestock saved from predation. Although it is impossible to accurately determine the amount of livestock PDM saves from predation, it can be estimated. Scientific studies have revealed that in areas without some level of PDM, losses of adult sheep and lambs to predators can be as high as 8.4% and 29.3% of the total number of head (Henne 1975, Munoz 1977, O'Gara et al. 1983). Conversely, other studies have indicated that sheep and lamb losses are significantly lower where PDM is applied (Nass 1977, Tigner and Larson 1977, Howard and Shaw 1978, Howard and Booth 1981). In evaluating cost effectiveness of PDM, USDA (1997) concluded that benefits, in terms of avoided sheep and lamb losses plus price benefits to consumers, are 2.4 times the cost of providing WS PDM services for sheep protection in the 16 western states. That analysis did not address the value of calf protection which is a substantial component of WS PDM services in New Mexico.

Most requests for PDM assistance that WS receives are to protect livestock on private lands. Production on private lands is higher per acre than on public lands primarily because private lands are generally the better agricultural lands and have better access to water (ie. along river bottoms), and are often used for lambing, calving and kidding grounds. Consequently, most livestock predation occurs on private lands. Of the livestock losses in 2001, 62% were on private land (Table 3). The percentage of losses is also reflected in the lands under agreement; 65% of the lands under agreement are privately versus the 43% of the lands in New Mexico that are privately owned. Total losses caused by predators on private lands was 4,343 or 62%

from all lands for sheep, cattle, and goats in New Mexico for 2001, but the value was $848,967 or 71% of the value because significantly more calves, valued higher, were killed on private lands.

Table 3. Livestock lost to predators in New Mexico on private and public lands reported to WS for calendar year 2001.

Livestock	Predator	Private	BLM	USFS	Other Land
Sheep	Coyote	114	39	18	-
	Cougar	265	341	-	-
	Bobcat	2	10	-	-
	Black Bear	6	-	-	-
	Feral Dog	8	-	-	-
	Total	395	390	18	0
	Value	$32,900	$34,250	$1,080	$0
Lambs	Coyote	1,416	851	80	8
	Cougar	179	180	-	-
	Bobcat	631	583	-	-
	Black Bear	-	-	13	-
	Feral Dog	17	10	6	-
	Total	2,243	1,624	99	8
	Value	$129,337	$104,666	$5,980	$480
Cattle	Coyote	39	9	1	-
	Cougar	8	1	-	-
	Black Bear	1	1	-	-
	Feral Dog	1	-	-	-
	Total	49	11	1	0
	Value	$23,800	$3,950	$500	$0
Calves	Coyote	1,344	311	22	12
	Cougar	115	35	23	-
	Black Bear	21	10	9	-
	Feral Dog	18	7	-	-
	Badger	-	5	-	-
	Total	1,498	368	54	12
	Value	$656,060	$161,175	$21,900	$5,400
Goats	Coyote	5	-	-	-
	Total	5	0	0	0
	Value	$250	$0	$0	$0
Kid goats	Coyote	56	5	-	-
	Cougar	20	-	-	-
	Bobcat	77	65	-	-
	Total	153	70	0	0
	Value	$6,620	$3,395	$0	$0
Total Number Livestock Lost		4,343	2,463	172	20
Total Value of Livestock Lost		$848,967	$307,436	$29,460	$5,880

Public lands administered by BLM, lands owned by the USFS, and other non-private lands in New Mexico are used to graze cows, sheep, and goats (Table 3). BLM lands showed comparable losses of sheep and lambs to private lands for coyotes, cougars, and bobcats. Total losses of sheep, cattle, and goats caused by predators were 2,463 head valued at $307,436 on BLM lands, 172 head valued at $29,460 on USFS lands, and 20 head valued at $5,880 on other non-private lands in 2001. Losses for non-private lands were 38%

of the total reported lost which is similar to the acres under agreement (44% of the lands). Losses in 2001 were typical of previous years and losses of livestock can be expected to be similar in future years.

In addition to direct livestock losses to predators such as predation and injury, producers also lose livestock indirectly to predators. A potential indirect loss to cattle producers is disease transmission from predators. For example, cattle can become infected with rabies after being bitten by infected animals such as skunks and fox. Indirect losses are typically minor, but the potential losses can be devastating should a major outbreak occur. WS periodically assists State Health programs in monitoring disease prevalence by taking blood samples from captured animals, though this has not been done in recent years.

1.3.3 Need for Predator Damage Management for Protection of Crops, Property, and Human Health and Safety

Predators impact a number of resources in New Mexico other than livestock. Typically this damage is less than the damage to livestock, yet it can be very significant. Other resources that predators can damage include crops, property, and natural resources, and predators can represent a threat to human health and safety.

1.3.3.1 Crops. Field crops such as melons (watermelons and cantaloupes), milo, sweet and field corn, and wheat have been damaged by predators such as coyotes, feral/free-roaming dogs, badgers, and raccoons. Fruit and nut crops have been damaged by raccoons and ringtails in New Mexico. Another type of problem is improved or planted pasture damage caused by badgers and coyotes burrowing; this digging activity often leaves the ground uneven which can hamper the use of planting and mowing equipment and result in damage to the equipment.

Damage to crops from predators in FY04 included only damage to watermelons from coyotes valued at$ 875. In FY03 it included $1,375 damage to watermelons from coyotes, $1,000 damage to alfalfa fields from badgers, and $10 damage to pecans from raccoons. In addition, striped skunks black bears, and gray fox were responsible for damage to crops from FY98-FY02.

1.3.3.2 Aquaculture. WS responds to requests from cooperators to resolve problems at aquaculture facilities, which are increasing in number throughout southern states and periodically including home ponds, involving predators, primarily from raccoons, mink and bears. In FY01, feral house cats were involved in 1 incidence of damage to ornamental fish. No other requests for assistance to resolve predator damage at aquaculture facilities were received in the last six fiscal years.

1.3.3.3 Other Agriculture. Several other commodities associated with agricultural can be damaged by predators such as beehives, haystacks, livestock feed, and eggs. No losses were recorded in FY04 to these resources. Losses in FY03 included $200 damage to livestock feed bags from raccoons and $20 in eggs by striped skunks. Additional species responsible for damage to other agricultural products from FY98 to FY02 were black bears, coyotes, badgers, and striped skunks with bears typically causing the greatest damage to beehives.

1.3.3.4 Property. WS also responds to requests from permittees, landowners, and other agencies to alleviate property damage from predators such as: coyotes, cougars, or raccoons killing pets; black bears breaking in and destroying the interiors of homes or other structures; coyotes and bears causing damage to drip irrigation

systems by biting holes in the pipe; raccoons and skunks burrowing into or under homes to den; and badgers, skunks, or raccoons causing damage to landscaping, gardens, or golf courses from feeding activities. In FY04, WS reported predator damage to a variety of property for 62 incidences from coyotes, striped skunks, cougars, feral cats, badgers, black bear, and raccoons valued at $5,057. Of the property, 73 pets were predated, injured or harassed by coyotes, cougars, and striped skunks. Many of these pets did not have a value, but many of the owners were distraught by their loss. In FY03, WS reported predator damage to a variety of property for 30 incidences from coyotes, striped skunks, feral cats, black bear, raccoons, and badgers valued at $2,375. Other than these species, bobcats, feral domestic ferrets, gray fox, cougars, opossums, and ringtails were also responsible for damage to property in the prior five fiscal years.

1.3.3.5 Human Health and Safety. WS conducts limited PDM actions in New Mexico to reduce human health and safety concerns for the public. Human health and safety concerns include: human attacks from cougars, bears, and coyotes that result in injuries or death; disease threats from rabies and plague outbreaks where predators act as reservoirs; odor and noise nuisances from skunks, opossums, and raccoons in attics and under houses; and airstrike hazards from coyotes crossing runways at airports or airbases. Typically the biggest concern, though a rarity, is the threat of attacks on people by large predators. Although a rarity, a black bear did kill a woman in September 2001 in her home. This is the first person in New Mexico killed by a bear. Similarly rare, cougar attacks on humans in the western U.S. and Canada, though, have increased markedly in the last two decades, primarily due to increased cougar populations and human use of cougar habitats (Beier 1992). No cougar-caused fatalities have been documented in New Mexico, but recent fatal attacks in California and Colorado emphasize the need for awareness. Baker and Timm (1998), after several human-coyote interactions in an area, concluded that the use of leghold traps to capture and euthanize a few coyotes would be the best method to resolve the problem and have the most lasting effects. After a child was killed by a coyote in Glendale, California, city and county officials trapped 55 coyotes in an 80-day period from within one-half mile of the home, an unusually high number for such a small area (Howell 1982).

WS assists many residents, especially in urban areas such as Albuquerque, concerned about coyote attacks on their pets and their apparent loss of fear for humans. Predator attacks on humans fortunately occur very rarely, but could result in requests for assistance under the current program. During FY02, WS responded to one incident involving a human injury from a coyote, 2 incidents where coyotes and 1 incident where a black bear were perceived as posing a threat to public safety. In prior years, WS has responded to complaints involving cougars that were perceived as threats to public safety. Recommendations are generally made to consider exclusion methods to reduce human health and safety concerns, but the animals present are often removed. Striped skunks (72%), feral cats (9%), coyotes (9%), black bears (2%), raccoons (2%), cougar (2%), gray fox (1%), feral dog (1%), and ringtails (1%) were responsible for 96 human health and safety requests in FY03, including identified threats and nuisance complaints. In FY04, striped skunks (70%), coyotes (16%), feral cats (3%) black bears (3%), cougar (3%), feral dog (2%), and bobcats (2%) were responsible for 61 human health and safety requests. In addition to these species, badgers, red fox, opossums, hog-nosed skunks, and spotted skunks have been involved in human health and safety concerns in the prior five fiscal years, FY98 to FY03.

1.3.3.6 Natural Resources. Predators are sometimes responsible for requests for assistance involving natural resources such as T&E, sensitive, and game species protection. WS conducted one PDM project for natural resources in FY03, cougar management for the protection of mule deer (*Odocoileus hemionus*). WS has also conducted coyote management for the protection of lesser prairie-chickens and pronghorn (*Antilocapra americana*), and cougar management for the protection of bighorn sheep (*Ovis canadensis*) and

elk (*Cervus elaphus*) in the prior 5 FYs. WS is responsive to agencies with management responsibilities for wildlife species that are impacted by predation. PDM for wildlife protection can be very effective when predation has been identified as a limiting factor. WS works with these agencies to identify and provide the level of protection needed. When such actions are requested by USFWS or another Federal agency, the responsibility for NEPA compliance rests with that agency. However, WS could agree to meet the responsibility for NEPA compliance at the request of the other Federal agency.

Deer, Bighorn Sheep, and Antelope. Under certain conditions, predators, especially coyotes and cougars, can have adverse impacts on mule deer, bighorn sheep, and pronghorn antelope populations, and this predation is not necessarily limited to sick or inferior animals (Pimlott 1970, Bartush 1978, USFWS 1978, Hamlin et al. 1984, Neff et al. 1985, Shaw 1977). Connolly (1978) reviewed 68 studies of predation on wild ungulate populations and concluded that in 31 cases, predation was a limiting factor.

Mackie et al. (1976) documented high winter loss of mule deer to coyote predation in north-central Montana and stated that coyotes were the cause of most overwinter deer mortalities. Teer et al. (1991) documented that coyote diets contain nearly 90% deer during May and June. They concluded from work done at the Welder Wildlife Refuge, Texas that coyotes take a large portion of the fawns each year during the first few weeks of life. Remains of 4 to 8 week old fawns were also common in coyote scats (feces) (Steele 1969, Cook et al. 1971, Holle 1977, Litvaitis 1978, Litvaitis and Shaw 1980). Mule deer fawn survival was significantly increased and more consistent inside a predator-free enclosure in Arizona (LeCount 1977, Smith and LeCount 1976). Hamlin et al. (1984) observed that a minimum of 90% summer mortality of fawns was a result of coyote predation. Trainer et al. (1981, 1983) reported that heavy mortality of mule deer fawns during early summer and late autumn and winter was limiting the ability of the population to maintain or increase itself. Their study concluded that predation, primarily by coyotes, was the major cause for low fawn survival on Steens Mountain in Oregon. Other authors observed that coyotes were responsible for most of fawn mortality during the first few weeks of life (Knowlton 1964, White 1967).

Guthery and Beasom (1977) demonstrated that after coyote damage management, deer fawn production was more than 70% greater after the first year, and 43% greater after the second year in their southern Texas study area. Another Texas study (Beasom 1974a, b) found that predators were responsible for 74% and 61% of the fawn mortality for two consecutive years. Stout (1982) increased deer production on three areas in Oklahoma by 262%, 92% and 167% the first summer following coyote damage management, an average increase of 154% for the three areas. Annual losses of deer fawns in Oklahoma were found to be about 88% with coyotes responsible for 88% to 97% of the mortality (Garner 1976, Garner et al. 1976 and Bartush 1978). Knowlton and Stoddart (1992) reviewed deer productivity data from the Welder Wildlife Refuge following coyote reduction. Deer densities tripled compared with those outside the enclosure, but without harvest management, ultimately returned to original densities due primarily to malnutrition and parasitism.

Jones (1949) believed that coyote predation was the main limiting factor of pronghorn antelope in Texas. A six-year radio telemetry study of pronghorn antelope in western Utah showed that 83% of all fawn mortality was attributed to predators (Beale and Smith 1973). In Arizona, Arrington and Edwards (1951) showed that intensive coyote damage management was followed by an increase in pronghorn antelope to the point where antelope were once again huntable, whereas on areas without coyote damage management this increase was not noted. Similar observations of improved pronghorn antelope fawn survival and population increase following damage management have also been reported (Riter 1941, Udy 1953, and Smith et al. 1986). Major losses of pronghorn antelope fawns to predators have been reported from additional radio

telemetry studies (Beale 1978, Barrett 1978, Bodie 1978, Von Gunten 1978, Hailey 1979, and Tucker and Garner 1980). Coyote damage management on Anderson Mesa, Arizona increased the herd from 115 animals to 350 in three years, and peaking at 481 animals in 1971 (Neff et al. 1985). After coyote damage management was stopped, the pronghorn fawn survival dropped to only 14 and 7 fawns per 100 does in 1973 and 1979, respectively. Initiation of another coyote damage management program began with the reduction of an estimated 22% of the coyote population in 1981, 28% in 1982, and 29% in 1983. Pronghorn antelope populations on Anderson Mesa, during 1983, showed a population of 1,008 antelope, exceeding 1,000 animals for the first time since 1960. Fawn production increased from a low of 7 fawns per 100 does in 1979 to 69 and 67 fawns per 100 does in 1982 and 1983, respectively. After a five-year study, Neff and Woolsey (1979, 1980) determined that coyote predation on pronghorn antelope fawns was the primary factor causing fawn mortality and low pronghorn densities on Anderson Mesa, Arizona. Smith et al. (1986) noted that controlling coyote predation on pronghorn fawns could result in 100% annual increases in population size, and that coyote removal was a cost-effective strategy in pronghorn antelope management.

Bighorn sheep are susceptible to predation, especially where their populations have reached precariously low numbers (Mooring et al 2004). Cougars are the primary predator of bighorns, but coyotes and bobcats will also take them. Mooring et al. (2004) found that in New Mexico, rams had the highest predation rates and thought it was mostly from cougars. It has been thought that the rams use habitat conducive to predation by cougars, poor post-rut body condition, and are more easily stalked because their curls block more of their rear vision (Harrison and Hebert 1989, Schaefer et al. 2000, Mooring et al. 2004). However, other studies found that lambs (Ross et al. 1997) and females (Krausman et al. 1989) were taken more by cougars in proportion to their population; other studies found that predation rates reflected the proportion of sex and age class in the population (Hayes et al. 2000)or a particular cougar's predation habits (Ross et al. 1997). Concern has arisen in New Mexico for certain populations of bighorn sheep and they are on the State endangered list; WS may be asked to protect them, especially where their populations reach a level that surpasses the point where the benefits of herd group size has anti-predator strategies (Mooring et al. 2004).

The above cases show that coyote predation had a significant influence on white-tailed deer (*Odocoileus virginianus*), black-tailed deer (*O. hemionus columbianus*), pronghorn antelope and bighorn sheep populations. Ballard et al. (2001) reviewed published predator-deer relationship studies, including many of those above, since the mid 1970s and found that predators (coyote, cougar, and wolf) could cause significant mortality, but PDM may or may not result in higher populations and increased harvest levels for hunters. They found that PDM benefitted big game mostly when herds were well below forage carrying capacity, predation was identified to be a limiting factor, PDM efforts sufficiently reduced the predator population, PDM efforts were timed correctly (prior to fawning and denning), and PDM was focused on a small scale (<259 mi^2). Conversely, PDM was not effective when the above conditions were not met. In addition, Ballard et al. (2001) suggested that the experimental design of research being conducted on PDM to benefit deer needed to be improved because it was unclear in several studies if PDM had a significant effect protecting deer herds. The most convincing evidence of deer population increases as a result of PDM were from studies conducted in small enclosures (< 15 mi^2) because predator populations were much easier to regulate in smaller areas.

Clearly, under some circumstances, PDM can be an important tool in maintaining specific wildlife management objectives. PDM activities to protect big game species in New Mexico to reduce excessive predation is a decision that primarily rests with NMDGF, and WS would assist NMDGF at their request. WS would strive to provide protection and conduct such actions in areas where suggests that PDM activities

would likely be effective and successful (Ballard et al.2001). However, as the management agency, NMDGF would determine when and where PDM would be conducted.

Nesting Upland Gamebirds, Waterfowl, and Shorebirds. WS has not received requests from NMDGF and private landowners to provide protection for certain species of nesting upland gamebirds, waterfowl and shorebirds from predators. Many PDM projects conducted by WS nationwide for nesting birds are because they are T&E species. Two federally listed species in New Mexico, the endangered interior least tern and candidate lesser prairie-chicken, have been impacted by predators. WS has conducted PDM for lesser prairie-chickens where coyotes were identified as a limiting factor in their abundance. Additional support may be given to these species should it be determined that predation from predators has limited their viability. PDM projects for nesting birds are typically of short duration and limited to the critical nesting periods when the eggs and setting birds are most vulnerable. PDM activities for nesting birds are typically focused on a few species of mammalian predators notorious for robbing nests of eggs and nestlings such as raccoons, skunks, and coyotes. PDM focused on increasing nest production have proven very successful.

Sage grouse populations have declined throughout New Mexico and much of the western U.S. over the last several decades due to a variety of environmental factors (Connelly and Braun 1997). Sage grouse populations occupying habitats that are highly fragmented or in poor ecological condition may exhibit relatively low nest success, low juvenile recruitment, and poor adult survival that may be related to increased predation (Gregg 1991). Populations of some of the most important prairie grouse predators have increased dramatically over the last 100 years (see analysis related to coyote and red fox in Chapter 4), and even in areas of good habitat, predator populations can be so abundant that habitat alone may not suffice to allow grouse populations to increase (Bergerud 1988). Schroeder and Baydack (2001) suggested that as habitats become more fragmented and populations of prairie grouse become more threatened, it becomes more important to consider PDM as a potential management tool. Because damaged sagebrush habitats may take 15-30 years to recover, a predator management strategy that effectively increases nest success and juvenile survival may be useful in offsetting some of the negative effects of poor habitat. This approach might also allow a more rapid recovery of grouse populations following habitat recovery. After 3 years of monitoring the movement, survival and reproduction of reintroduced sharp-tailed grouse (*Tympanuchus phasianellus*) in northeastern Nevada, Coates and Delehanty (2001) recommended that future reintroductions of sharp-tailed grouse be preceded by 2 months of PDM to increase survival of released birds. In a survey of U.S. public attitudes regarding predators and their management to enhance avian recruitment, Messmer et al. (1999) found that given information suggesting predators are among the threats to a declining bird population, the public generally supported using PDM for the protection of bird populations.

Batterson and Morse (1948) documented heavy predation on sage grouse nests in northeastern Oregon, and, while the highest limiting factor was raven predation, it was documented that coyotes and badgers also contributed to nest predation. Keister and Willis (1986) suggested that the major factor in determining sage grouse population levels in their study area in southeastern Oregon was loss of nests and chicks during the first 3 weeks after hatching. Coyotes and ravens were suspected as the primary nest predators. A coyote removal project was implemented on their study area, and sage grouse productivity increased dramatically from 0.13 chicks/hen to 2.45 chicks/hen in just 3 years. Willis et al. (1993) analyzed data on sage grouse and predator populations, weather, and habitat from an area of Oregon that had some of the best sage grouse habitat in the state. The only meaningful relationship they found was a significant negative correlation between coyote abundance and the number of sage grouse chicks produced per hen. They concluded that fluctuation in predator abundance was probably the single most important factor affecting annual

productivity of sage grouse in their study area. Presnall and Wood (1953) documented an example illustrating the potential of coyotes as predators on sage grouse. In tracking a coyote approximately 5 miles to its den in northern Colorado, they found evidence along the way that the coyote had killed three adult sage grouse and destroyed a sage grouse nest. Examination of the stomach contents from an adult female coyote removed the next day revealed parts of an adult sage hen plus six whole newly-hatched sage grouse chicks. The area around the den was littered with sage grouse bones and feathers. No other prey remains were found around the den, and it appeared that the pups had been raised largely upon sage grouse.

Burkepile et al. (2001) radio-marked 31 chicks from 13 broods in 1999 and 44 chicks from 15 broods in 2000. Survival estimates for 1999 and 2000 were only 15% and 18%, respectively. Predators were responsible for 90% of the mortality in 1999 and 100% of the mortality in 2000. Red fox were believed to be one of the primary chick predators, but predation was also confirmed by unidentified avian and other mammalian predators as well. Bunnell and Flinders (1999) also documented significant predation by red fox on sage grouse in their study area in Utah, and recently revised sage grouse management guidelines (Connelly et al. 2000) suggest that red fox populations should be discouraged in sage grouse habitats. To the extent that red fox, coyotes, and other predators which prey on chicks are also preying on eggs, reducing the populations of these predators from sage grouse nesting and early brood-rearing areas has the potential to benefit both nesting success and chick survival.

Dumke and Pils (1973) reported that ring-necked pheasant Phasianus colchicus) hens were especially prone to predation during their nest incubation period. Trautman et al. (1974) examined the effects of predator removal on pheasant populations in South Dakota by monitoring pheasant populations in similar 100 mi^2 areas with and without PDM. They examined two variations of predator removal, one targeting only red fox for 5 years, and the other targeting badger, raccoon, striped skunks and red fox for 5 years. They found pheasant densities were 19% and 132% higher in predator removal areas than in non-removal areas during fox removal and multiple predator species removal, respectively. Chesness et al. (1968) examined the effects of predator removal on pheasant populations in paired treatment and non-treatment areas in Minnesota over 3 years by targeting primarily nest predators, including skunks, raccoons, and crows. They reported a 36% hatching success in predator removal areas versus a 16% hatching success in non-removal areas, as well as higher clutch sizes and chick production in predator removal areas. Nohrenberg (1999) investigated the effects of limited predator removal on pheasant populations on his study areas in southern Idaho and found consistently higher pheasant survival and productivity in predator removal areas as compared to similar non-removal areas.

Predators were responsible for more than 40% of nest failures in wild turkeys (*Meleagris gallopavo*) (Thomas 1989, Speake 1985). Everret et al. (1980) reported that predators destroyed 7 of 8 nests on his study area in northern Alabama. Lewis (1973) and Speake et al. (1985) reported that predation was also the leading cause of mortality in turkey poults, and Kurzejeski et al. (1987) reported in a radio-telemetry study that predation was the leading cause of mortality in hens. Wakeling (1991) reported that the leading natural cause of mortality among older turkeys was coyote predation, with the highest mortality rate for adult females occurring in winter. Other researchers report that hen predation is also high in spring when hens are nesting and caring for poults (Speake et al. 1985, Kurzejeski et al. 1987, Wakeling 1991). Williams et al. (1980) reported a 59% hatching success for turkeys prior to a predator poisoning campaign, versus a 72% hatching success following a predator poisoning campaign.

In a study of waterfowl nesting success in Canada, researchers found that eggs in most nests were lost to

predators such as red foxes, coyotes, striped skunks, raccoons, Franklin's ground squirrels Spermophilus. franklinii), badgers, black-billed magpies and American crows (Johnson et al. 1988). Cowardin et al. (1985) determined that predation was by far the most important cause of nest failure in mallards Anas platyrhynchos) on their study area. Various studies have shown the skunk and raccoon to be a major waterfowl nest predator resulting in poor nesting success (Keith 1961, Urban 1970, Bandy 1965). On the Sterling Wildlife Management area in southern Idaho, striped skunks, red fox and black-billed magpies were documented as common predators of nesting ducks, with magpie predation identified as the most significant factor limiting waterfowl production (Gazda and Connelly 1993). Pearse and Ratti (2004) found that the removal of predators from study areas increased the survival of mallard ducklings by 60%. Researchers documented the effects of red fox predation on waterfowl in North Dakota (Sargeant et al. 1984) and concluded that reducing high levels of predation was necessary to increase waterfowl production. Balser et al. (1968) determined that predator damage management resulted in 60% greater production in waterfowl in areas with damage management as compared to areas without damage management. He also recommended that when conducting predator damage management, the entire complex of potential predators should be targeted or compensatory predation may occur by a species not under control, a phenomena also observed by Greenwood (1986). Rohwer et al. (1997) documented a 52% nesting success for upland nesting ducks in an area receiving PDM, versus only a 6% nesting success in a similar non-treatment area. Garrettson and Rohwer (2001) likewise documented dramatically higher duck nesting success in areas where predators were removed during the nesting season as compared to areas where no predators were removed, and noted that the annual nature of predator removal allowed for greater management flexibility than most habitat management efforts.

Production of sandhill cranes (*Grus canadensis*) at Malheur National Wildlife Refuge in southeastern Oregon was severely limited by predation from coyotes, ravens, raccoons, and mink. PDM focused on these species in the refuge resulted in increased colt survival (from 1 crane colt surviving to 60) as well as increased production of other waterfowl (USFWS 1989, 1990, 1991, 1994). Several other predators can damage nesting waterfowl, primarily their eggs, such as skunks and foxes. Typically the goal of PDM is to suppress these populations during the nesting season to increase production of the protected wildlife species.

Other Species. WS may be requested to help protect other species. If a management agency finds that a particular species has been impacted by predation, WS could assist in determining if PDM efforts could help protect the species and implement necessary, if any, PDM actions to correct it. Species being given protection often are T&E species. A T&E species that could potentially be reintroduced in New Mexico that is given protection from predators, especially prior to their reintroduction, is the black-footed ferret. In the first reintroduction effort by USFWS, 34 of 39 reintroduced ferrets were killed by predators. As a result of the impact of predation, PDM is now conducted at sites where ferrets are going to be reintroduced prior to their release. In addition, WS could provide protection for the federally endangered interior least terns and federal candidate lesser prairie-chickens from predators if USFWS or other management agency requested such actions.

1.4 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

- **WS Programmatic Environmental Impact Statement.** USDA (1997) completed a Final EIS on the national APHIS-WS program. This EA is consistent with the Record of Decision signed for the Final EIS. Pertinent information available in USDA (1997) has been incorporated by reference into this EA.

- **New Mexico WS EAs.** WS completed 3 EAs at the District level in 1997 (WS 1997a, b, c) and these were supplemented with new issues that had arisen in 1999 (WS 2001a, b, c). This EA will replace those 3 EAs and include most of the information to provide a statewide look at PDM. This EA also includes information for additional predators, but does not include predatory birds that were included in previous EAs. Birds will be included in a new statewide bird damage management EA. Until that is complete, the EAs still include the analysis for predatory birds and will be monitored separately.

- **National Level Memoranda of Understanding (MOU).** MOUs have been signed between WS and BLM, and WS and USFS which recognize WS's responsibilities for WDM and related compliance with NEPA on BLM and USFS lands. WS is recognized through the MOUs with BLM and USFS as being the lead agency concerning most WDM on public lands; USFS and BLM are responsible for NEPA compliance when WDM is to protect federal resources such as gopher control to planted seedlings. In the current MOUs that WS has with USFS and BLM, it is recognized that the State has management authority over resident wildlife. NMDGF and NMDA are the State entities that have been given the primary management authority for resident wildlife (authorities discussed Section 1.6.1) and establishes the management objectives for these species and their damage. WS defers to State laws in the management of predators on these federal lands.

- **National Forest Land and Resource Management Plans.** The National Forest Management Act requires that each National Forest prepare a Land and Resource Management Plan (LRMP) for guiding long-range management and direction. The 5 National Forests and their corresponding Forest Supervisor's Office (Carson (6 Ranger Districts), Cibola (4 Ranger Districts), Gila (6 Ranger Districts), Lincoln (3 Ranger Districts), and Santa Fe (5 Ranger Districts)) and 2 National Grasslands (Kiowa and Rita Blanca) have provided input into this EA to ensure consistency with LRMP. WS provides USFS District Rangers, the Forest Supervisors, or both with Work Plans annually on those Ranger Districts where WS expects to conduct PDM. USFS discusses the compatibility of the proposed PDM activities with the LRMP. WS conducts the PDM activities according to all applicable laws and regulations. Currently, WS conducts PDM on 3 National Forests.

- **BLM Resource Management Plans.** BLM currently uses Resource Management Plans (RMPs) to guide land management for lands it administers. New Mexico has 7 BLM Field Offices (Albuquerque, Carlsbad, Farmington, Las Cruces, Roswell, Socorro, and Taos). WS has coordinated with the BLM State Office in Santa Fe and each BLM Field Office to ensure that this EA has been reviewed and conforms with RMPs as related to land management. WS provides the appropriate BLM Field Offices with Work Plans annually where WS expects to conduct PDM. BLM discusses the compatibility of the proposed PDM activities with the RMP. WS conducts the PDM activities according to all applicable laws and regulations. WS conducts PDM on most BLM Districts annually. If requested, WS could potentially conduct PDM on any BLM District in the State where appropriate (i.e., to protect livestock on allotments, wildlife, or human safety). Currently, WS conducts work on 4 of BLM Field Offices.

- **NMDGF Management Plans.** NMDGF has, or are in the process of completing, management plans for cougars, black bear, and furbearers that outlines NMDGF's objectives for these species populations and clarifies the legal roles and roles and responsibilities of other agencies regarding

wildlife damage management. Any decision made as a result of this EA process would be consistent with guidance in these plans.

1.5 DECISIONS TO BE MADE

WS is the lead agency for this EA, and therefore responsible for the scope, content, and decisions made. Cooperating agencies in the production of this EA are NMDA, NMDGF, BLM, USFS, and USFWS. Each of the cooperating agencies were asked to provide input and direction to WS to insure that Program actions are in accordance with applicable regulations and policies, and with the desires of the State of New Mexico.

Based on the scope of this EA, the following decisions need to be made.

- Should PDM, as currently implemented, be continued in New Mexico under one EA?
- If not, how should WS fulfill its legislative responsibilities in New Mexico?
- What standard operating procedures (SOPs) should be implemented to lessen identified potential impacts?
- Does the proposed action have significant impacts requiring preparation of an EIS?

1.6 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.6.1 Actions Analyzed

This EA evaluates PDM to protect livestock, crops, property, natural resources and human health and safety in New Mexico.

1.6.2 American Indian Lands and Tribes

WS only conducts PDM at a Tribe's or their lessee's request. WS has been requested to provide assistance with PDM in New Mexico on Tribal lands. Since Tribal lands are sovereign and the methods employed are the same as for any private land upon which WS provides services, Tribal officials determine if PDM is desired and the PDM methods allowed. Because the Tribal officials have the ultimate decision on whether PDM is conducted, no conflict with traditional cultural properties or beliefs is anticipated. Therefore, this EA would cover PDM on Tribal lands, where requested and implemented.

1.6.3 Federal Lands

New Mexico has a large proportion of federal lands and WS is often requested to conduct PDM on them. The methods employed and potential impacts would be the same on these lands as they would be on private lands upon which WS provides service. Therefore, if WS were requested to conduct PDM on federal lands for the protection of livestock, property, human health and safety, or natural resources such as T&E species, provided impacts of PDM activities for their protection is considered, this EA would cover such actions implemented. NEPA compliance for PDM conducted to protect natural resources such as T&E species at the request of USFWS or other federal agency is the requesting agency's responsibility. However, WS could

accept the NEPA responsibility at the request of another agency, but that agency would still be responsible for writing a Record of Decision.

1.6.4 Period for Which This EA Is Valid

This EA will remain valid until WS determines that new demands for action or new alternatives for PDM have arisen that have different environmental affects and must be analyzed. At that time, this analysis and document will be supplemented pursuant to NEPA. This EA will be reviewed annually to ensure that it is complete and still appropriate for the scope of PDM activities in New Mexico.

1.6.5 Site Specificity

This EA analyzes potential impacts of PDM on the human environment as required by NEPA and addresses WS's PDM activities on all lands under Cooperative Agreement or Agreements For Control within New Mexico. It also addresses the impacts of PDM on areas where additional agreements with WS may be written in the reasonably foreseeable future in New Mexico. Because the proposed action is to continue the current program under one EA, and because the current program's goal and responsibility is to provide service when requested within the constraints of available funding and manpower, it is conceivable that additional PDM efforts could occur. Thus, this EA anticipates potential expansion and analyzes the impacts of such expanded efforts as part of the current program. This EA emphasizes significant issues as they relate to specific areas whenever possible. However, the issues that pertain to predator damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model (Figure 3) and WS Directive 2.105 is the site-specific routine thought process for determining methods and strategies to use or recommend for individual actions conducted by WS in New Mexico (see USDA 1997, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). The Decision Model is not intended to require documentation or a written record each time it is used, and it necessarily oversimplifies complex thought processes. Decisions made using the model would be in accordance with any SOPs described herein and adopted or established as part of the decision.

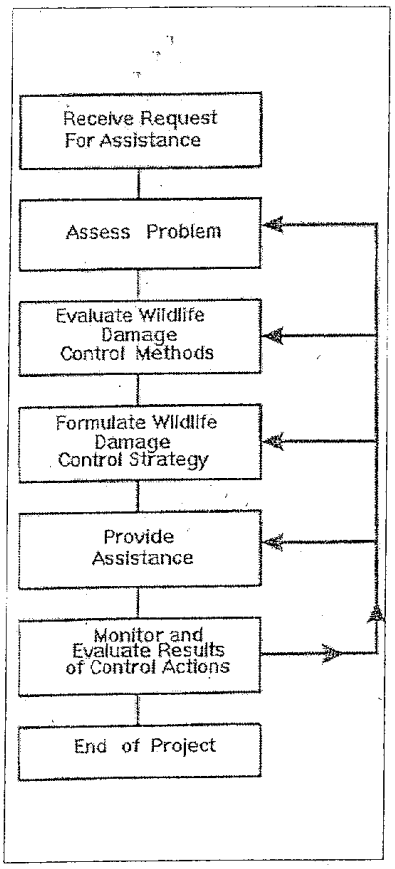

Figure 3. WS Decision Model used at the field level (Slate et al. 1992).

The analysis in this EA considers impacts on target, nontarget wildlife species, people, pets, and the environment. Wildlife populations, with the exception of T&E species, are monitored over large geographic areas (ie. the West, the State) and smaller geographic areas (ie., game management units). WS monitors target predator and nontarget take for the State and in each of the WS Districts. The game management units and Districts do not correspond to each other in New Mexico, thus, analysis of wildlife population impacts is better analyzed at the statewide level.

1.6.6 Interdisciplinary Development of the EA

Comments were solicited from the BLM, USFS, NMDA, NMDGF, and USFWS. Comments are maintained in an administrative file located at the WS State Office, 8441 Washington NE, Albuquerque, NM 87113-1001.

1.7 AUTHORITY AND COMPLIANCE

1.7.1 Authority of Federal and State Agencies for Wildlife Damage Management in New Mexico[5]

WS Legislative Authority. USDA is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for USDA is the *Act of March 2, 1931* and the *Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (7 U.S.C. 426-426c; 46 Stat. 1468)*, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, which provides that:

> *"The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."*

Since 1931, with the changes in societal values, APHIS, WS policies and programs place greater emphasis on the part of the Act discussing "bringing [damage] under control," rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative authority of APHIS, WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

> *"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."*

New Mexico Department of Fish and Game. NMDGF has the primary responsibility to manage all protected and classified wildlife in New Mexico, except Federally listed T&E species, regardless of the land class on which the animals are found (New Mexico Revised Statutes (NMSA) Title 17), including predators considered furbearers and big game. NMDGF is authorized by State law to contract with WS for controlling damage caused by big game and furbearers. Landowners, lessees or any other person or entity may obtain a permit to take furbearers and big game species causing excessive damage to property in New Mexico

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5 See Chapter 1 of USDA 1997 for a complete discussion of federal laws pertaining to WS.

(NMSA 17.3.31, 17.5.3). NMDGF is mandated that it resolve predator damage for private landowners or lessees (NMAC 19.30.2 and 6). NMDGF also issues permits for aerial hunting per the Fish and Wildlife Act of 1956, as amended, to landowners, lawful tenants, and lessees to take predatory animals (NMSA 17.3.45-47).

New Mexico Department of Agriculture. NMDA manages predatory animals that depredate agricultural and rangeland resources. NMDA is authorized to cooperate with WS to conduct PDM. NMDA also regulates the pesticide laws in New Mexico. WS registers any pesticides it uses with NMDA. Any WS personnel that use pesticides in their job duties, must become certified pesticide applicators through NMDA, or be supervised by a certified pesticide applicator. The M-44, Livestock Protection Collar (LPC), and large gas cartridge are the only predacides registered for use and pesticide users must be registered to use the first two under NMAC 21.17.57.1-11.

U.S. Fish and Wildlife Service. USFWS has statutory authority to manage Federally listed T&E species through the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531-1543, 87 Stat. 884) and migratory birds under the Migratory Bird Treaty Act of 1918 (16 U. S. C. 703-711; 40 Stat. 755), as amended. They are also responsible for managing refuges and conflicts with predators if they conflict with the refuge management goals.

U.S. Forest Service and Bureau of Land Management. USFS and BLM have the responsibility to manage the resources of federal National Forests, National Grasslands, and Public lands for multiple uses including livestock grazing, timber production, recreation and wildlife habitat, while recognizing the State's authority to manage wildlife populations. WS conducts PDM activities USFS and BLM lands in accordance with all applicable laws and regulations. These agencies recognize WS's expertise in PDM and rely on WS to determine the appropriate methodologies for conducting PDM to reduce livestock and other resource losses.

1.7.2 Compliance with Federal Laws. Several federal laws authorize, regulate, or otherwise affect WS PDM activities. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act (NEPA). All Federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). WS follows the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500 et seq.), USDA (7 CFR 1b), and the APHIS Implementing Guidelines (7 CFR 372) as a part of the decision-making process. These laws, regulations, and guidelines generally outline five broad types of activities to be accomplished as part of any project: public involvement, analysis, documentation, implementation, and monitoring. NEPA also sets forth the requirement that all major Federal actions be evaluated in terms of their potential significant impact on the quality of the human environment for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. Federal activities affecting the physical and biological environment are regulated, in part, by CEQ through regulations in Title 40, Code of Federal Regulations, Parts 1500-1508. In accordance with CEQ and USDA regulations, APHIS Guidelines Concerning Implementation of NEPA Procedures, as published in the Federal Register (44 CFR 50381-50384) provide guidance to APHIS regarding the NEPA process.

Pursuant to NEPA and CEQ regulations, this EA documents the analysis of a proposed Federal action's impact, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that the policies and goals of NEPA

are infused into Federal agency actions. An EA is prepared by integrating as many of the natural and social sciences as may be warranted based on the potential effects of the proposed action. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

Migratory Bird Treaty Act of 1918 (16 USC 703-711; 40 Stat. 755), as amended. The Migratory Bird Treaty Act provides the USFWS regulatory authority to protect native species of birds that migrate outside the United States. The law prohibits any "take" of these species, except as permitted by the FWS. The WS program receives annual authorization from the FWS to take migratory birds that are causing damage problems.

Endangered Species Act (ESA). It is WS and Federal policy, under the ESA, that all Federal agencies shall seek to conserve T&E species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts consultations with the USFWS, as required by Section 7 of the ESA, to use the expertise of the USFWS, to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species. . .*" (Sec.7(a)(2)). WS has obtained a Biological Opinion (BO) from USFWS describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). WS has conducted informal consultations with USFWS and NMDGF for the proposed PDM program specifically concerning the T&E species in New Mexico and these letters are on file. Both agencies concurred with WS's finding that the proposed action would not likely effect T&E species.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. All pesticides used or recommended by WS are registered with and regulated by the Environmental Protection Agency (EPA) and NDOA. WS uses the chemicals according to labeling procedures and requirements as regulated by EPA and NDOA.

National Historical Preservation Act of 1966, as amended (NHPA). NHPA and its implementing regulations (CFR 36, 800) require federal agencies to initiate the section 106 process if an agency determines that the agency's actions are undertakings as defined in Sec. 800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects on historic properties. If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under section 106. Each of the WDM methods described in Section 3.2.1.2 that might be used operationally by WS do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

Noise-making methods such as propane exploders, pyrotechnics, or firearms that are used at or in close proximity to historic or cultural sites for the purposes of hazing or removing nuisance predators have the potential for audible effects on the use and enjoyment of a historic property. However, such methods would

only be used at a historic site at the request of the owner or manager of the site to resolve a damage or nuisance problem, which means such use would be to benefit the historic property. A built-in mitigating factor for this issue is that virtually all of the methods involved would only have temporary effects on the audible nature of a site and can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary in those types of situations.

Native American Graves Protection and Repatriation Act. The Native American Graves Protection and Repatriation Act requires Federal agencies to notify the Secretary of the Department that manages the Federal lands upon the discovery of Native American cultural items on Federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

The Wilderness Act (Public Law 88-577(USC 1131-1136)). The Wilderness Act established a national preservation system to protect areas *"where the earth and its community life are untrammeled by man"* for the United States. Wilderness Areas (WAs) are devoted to the public for recreational, scenic, scientific, educational, conservation, and historical use. This includes the grazing of livestock where it was established prior to the enactment of the law (Sept. 3, 1964) and PDM is an integral part of a livestock grazing program. The Act did leave management authority for fish and wildlife with the State for those species under their jurisdiction. Some portions of WAs in New Mexico have historic grazing allotments and WS conducts limited PDM in a few annually in New Mexico for protecting livestock and other resources and follows all applicable laws and regulations in doing so.

Environmental Justice and Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Environmental Justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Executive Order 12898 requires Federal agencies to make Environmental Justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. A critical goal of Executive Order 12898 is to improve the scientific basis for decision-making by conducting assessments that identify and prioritize environmental health risks and procedures for risk reduction. Environmental Justice is a priority within USDA, APHIS, and WS. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA.

WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to ensure Environmental Justice. WS personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. All chemicals used by WS are regulated by the EPA through FIFRA, NDOA, by MOUs with Federal land managing agencies, and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used following label directions, they are highly selective for the target species or population, and such use has negligible impacts on the environment (USDA 1997, Appendix P). The WS operational program properly disposes of any excess solid or hazardous waste. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

Executive Order 13045 - Protection of Children from Environmental Health and Safety Risks.

Children may suffer disproportionately from environmental health and safety risks, including their developmental physical and mental status, for many reasons. Because WS makes it a high priority to identify and assess environmental health and safety risks, WS has considered the impacts that alternatives analyzed in this EA might have on children. All WS predator damage management is conducted using only legally available and approved damage management methods where it is highly unlikely that children would be adversely affected.

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1.7.3 Compliance with State Laws. NMDGF manages big game (cougars and black bear) and furbearers, NMDA manages damage to agricultural and rangeland resources from predators, and counties and local agencies manage feral domestic animals. These agencies, and inherently WS, are bound to several State laws that regulate PDM. WS complies with these laws, and consults and cooperates with State and local agencies as appropriate. These laws are in NMSA or the New Mexico Administrative Codes (NMAC).

NMSA 6.11.5-6. Taylor Grazing Act and Farm and Range Improvement Fund. These statutes allow Taylor Grazing Act monies collected by the U.S. government to be used for PDM.

NMSA 17.2.41. Endangered species. This is the State law that provides special protection to State designated T&E species.

NMSA 17.3.31. Permit to capture or destroy protected game damaging crops or property; beavers. NMDGF can issue permits to take game under this Statute.

NMSA 17.3.46-47. Permits for Airborne Hunting. NMDGF can issue permits that allow the control of predators from aircraft under this statute. However, government employees are exempt.

NMSA 17.5.3. Seasons; Special Permits to Take Animals Doing Damage. NMDGF can issue permits under this statute to take fur-bearing animals doing damage to game, private property, poultry or livestock.

NMSA 77.15.1-14. Predatory Wild Animals and Rodent Pests. These statutes allow the state of New Mexico to cooperate with and fund WS PDM.

NMAC 19.30.2.1-11. Procedures for NMDGF to handle depredations caused by wildlife. These sections of provide information for NMDGF and private landowners on how to handle wildlife damage on private and leased lands. In essence, these set the time frames for handling wildlife complaints for NMDGF. NMDGF will provide landowners with short- and long-term solutions for depredation problems.

NMAC 19.30.6. Predator Management. These regulations apply to cougars and coyotes and outline procedures for conducting direct and preventative PDM for the protection of big game and livestock.

NMAC 19.32.2.11-12. Trap Inspection Requirements. These codes allow exemption from trap inspection requirements for personnel of NMDGF, NMDA, and WS who are acting in their official capacity in the control of depredating animals or for other management purposes.

New Mexico Animal Control Laws. In New Mexico, dog and cat control laws are the responsibility of local governmental agencies. County or municipal animal control officials or County sheriffs are responsible for responding to feral or stray dogs and cats that threaten, damage, or kill livestock. WS policy allows WS personnel to assist in feral dog and cat control at the request of local authorities upon approval of the WS State Director.

1.8 A PREVIEW OF THE REMAINING CHAPTERS IN THIS EA

This EA is composed of 5 chapters. Chapter 2 discusses and analyzes the issues and affected environment. Chapter 3 contains a description of each alternative, alternatives not considered in detail, and SOPs. Chapter 4 analyzes the environmental impacts associated with each alternative considered in detail. Chapter 5 contains the list of preparers of this EA, persons consulted, and the literature cited in the EA.

CHAPTER 2: ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), issues that were used to develop SOPs, and issues that will not be considered in detail, with brief discussion of those issues. Also included is a list of issues identified and addressed previous WS EAs (1997a, b, c, 2001a, b, c) on PDM in New Mexico, but for which explanations will not be repeated in this document because the issues were addressed and the discussion from those EAs remains virtually the same. Pertinent portions of the affected environment will be included in this chapter in the discussion of the issues. Additional affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4 and the description of the current program (the "No Action" Alternative as defined by CEQ) in Chapter 3.

2.1 ISSUES

The following issues or concerns about PDM have been identified through interagency planning and coordination, from the EAs which preceded this document, and from the USDA (1997) as areas of concern that will be addressed in this EA.

- Effects on Target Predator Species Populations
- Effects on Nontarget Species Populations, Including T&E Species
- Impacts on Public Safety, Pets, and the Environment
- Effects of PDM, especially Aerial Hunting Activities, on the Use of Public Lands for Recreation

2.1.1 Effects on Target Predator Species Populations

Maintaining viable populations of all native species is a concern of the public and of biologists within the state and federal land and wildlife management agencies, including WS. A concern of some is that WS PDM would adversely affect populations of target species, which, for purposes of this EA are primarily coyotes, cougars, and striped skunks. Scoping during USDA (1997) process revealed that some persons believe PDM interrupts the "balance of nature" and this should be avoided. Others believe that the "balance" has shifted to unfairly favor generalist species, including predators. Several species' populations have steadily increased over the past several years due to adaptability to human-made environments and damage from these species has increased accordingly (International Association of Fish and Wildlife Agencies 2004). To address these concerns, the effects of the alternatives on populations for each target species are examined. To fully understand the need for PDM, it is important to have a knowledge about the species that cause damage and the likelihood of damage. Full accounts of life histories for these species can be found in mammal reference books and field guides. Some background information is given here for the predator species in New Mexico covered by this EA, especially information pertaining to their range in New Mexico. The species are basically given in order of the value of damage they cause in New Mexico and WS PDM efforts directed towards them, but a few of the lesser damaging species are lumped with others where life history and damage are somewhat similar. Finally, it should be noted that jurisdiction and management of these species mostly lies with NMDGF which was discussed in Section 1.1.

Unprotected wildlife species, such as most non-native invasive species, are not protected under state or federal law. Most State-resident wildlife species are managed under State authority or law without any federal oversight or protection. In some states, with the possible exception of restrictions on methods (e.g., firearms restrictions, pesticide regulations), unprotected wildlife species and certain resident wildlife species are managed with little or no restrictions allowing them to be killed or taken by anyone at any time. For PDM in New Mexico, NMDGF has the authority to manage and permit the taking of most predators for damage management purposes (see Section 1.7.1).

When a non-federal entity (i.e. State wildlife agencies, State agriculture agencies, State health agencies, municipalities, counties, private companies, individuals, etc.) takes a management action on a State-resident wildlife species or unprotected wildlife species, the action is not subject to NEPA compliance due to the lack of federal involvement in the action. Under such circumstances, the environmental *baseline* or *status quo* must be viewed as an environment that includes those species *as they are managed or impacted by non-federal entities in the absence of the federal action being proposed.* Therefore, in those situations in which a non-federal entity has decided that a management action directed towards a state protected or unprotected wildlife species will occur and even the particular methods that will be used, WS's involvement in the action would not affect the *environmental status quo*. WS's decision-making ability is restricted to one of two alternatives - either taking the action using the specific methods as decided upon by the non-federal entity, or taking no action at all at which point the non-federal entity will take the same action anyway.

The inability to change the *environmental status quo* in the types of situations described above presents a clear question of whether there is enough federal control over the action to be taken to make direct assistance by WS a federal action requiring compliance with NEPA. This lack of federal control over the decision to be made is even clearer when the non-federal entity has committed to taking the same actions in the absence of any federal assistance from WS. Clearly, under these circumstances, by any analysis we can envision, WS would have virtually no ability to affect the *environmental status quo* by selecting any possible alternative, even the alternative of no federal action by WS.

Therefore, based on the discussion above, it is clear that in those situations where a non-federal cooperator has obtained the appropriate State permit or authority, and has already made the decision to remove or otherwise manage predators to stop damage with or without WS assistance, WS participation in carrying out the action would not affect the *environmental status quo*. In some situations, however, certain aspects of the human environment may actually benefit more from WS's involvement than from a decision not to assist. For example, if a cooperator believes WS has greater expertise to selectively remove a target species than a non-WS entity; WS management activities may have less of an impact on target and non-target species than if the non-federal entity conducted the action alone. Thus, in those situations, WS involvement may actually have a *beneficial* effect on the human environment when compared to the *environmental status quo* in the absence of such involvement.

2.1.1.1 Coyote. Coyotes are an unprotected predator in New Mexico and can be taken at any time. Of all predators in New Mexico, coyotes kill the majority of livestock that is reported to or verified by WS, about two thirds, and, therefore, a major focus of WS PDM efforts in New Mexico. Coyotes were responsible for almost $166,000 damage to livestock, crops, and pets in the 489 complaints reported to or verified by WS during FY03. From FY98 to FY03, coyotes were responsible for an average of 526 complaints, about 60% of all mammalian predator complaints. The resources protected, in order of reported economic loss in FY03 included livestock, primarily lambs, calves, and ewes, property (e.g., drip irrigation lines, pets) and human

health and safety (i.e., concern for children and pet safety). Coyotes predated 4,330 livestock as reported by WS cooperators in 2001. In addition, coyote predation on other wildlife species in New Mexico such as mule deer and antelope has created concern in some areas, but no value has been given to such losses.

Coyotes were once found only in western States, but have expanded their range in recent history to much of North America. They are very common in New Mexico and found statewide (Thompson et al. 1992) at moderate to high density levels (USFWS 1978). To discuss the impacts of various environmental constraints and external factors on coyote populations and density, it is essential to understand the basic mechanisms that play a role in the coyote's response to constraints and actions. This species is often characterized by wildlife biologists as having a unique resilience to change because they have a strong ability to adapt to adverse conditions and persevere. Habitat changes that have occurred over the last two hundred years often favor this species.

Determinations of absolute densities for coyote populations are frequently limited to educated guesses (Knowlton 1972). Coyotes are highly mobile animals with home ranges (territories) that vary seasonally and with the sex, age, and breeding status of the animal (Todd and Keith 1976, Althoff 1978, Pyrah 1984). The literature on coyote spatial organization is confusing (Messier and Barrette 1982, Windberg and Knowlton 1988). Coyote home ranges may vary from 2.0 mi^2 to 21.3 mi^2 (Andelt and Gipson 1979, Gese et al.1988[6]). Ozoga and Harger (1966), Edwards (1975), and Danner (1976), though, observed a wide overlap between coyote home range and did not consider coyotes territorial. Each occupied coyote territory may have several nonbreeding helpers at the den during whelping (Allen et al. 1987, Bekoff and Wells 1982). Therefore, each defended coyote territory may have more than just a pair of coyotes. Messier and Barrette (1982) reported that from November through April, 35% of the coyotes were in groups of three to five animals and Gese et al. (1988) reported that coyote groups of 2, 3, 4, and 5 comprised 40%, 37%, 10% and 6% of the resident population, respectively. The presence of unusual food concentrations and nonbreeding helpers at the den can influence coyote densities, and complicate any effort to estimate abundance (Danner and Smith 1980). A positive relationship was established between coyotes densities in mid-late winter and the availability of dead livestock (Roy and Dorrance 1985).

To understand impacts of this take, it is critical to have a relative idea of the population size. Coyote population estimates for New Mexico were not available in the literature or from New Mexico agencies. However, an estimate suitable for purposes of analysis can be made using information on coyote biology and population dynamics, and tempering the "reasonableness" of the estimate by considering field observations of WS personnel. These types of estimates of carnivore populations are based on a knowledge of the species, experience, and intuition and may be as accurate as those based on more scientific methods (Fritzell 1999). Many authors have estimated coyote populations throughout the West and elsewhere (Andelt 1985, Pyrah 1984, Camenzind 1978, Knowlton 1972, Clark 1972, USFWS 1979). Scent-post survey densities for New Mexico from 1972 to 1977 averaged 133 coyote visits/1,000 scent posts in one of the most widespread studies undertaken on predator densities (USFWS 1979). New Mexico has relatively moderate to high densities of coyotes; in general coyote populations decrease as you travel north in the 13 western States averaging 149 visits/1,000 scent posts in the southern tier of western States, 114/1,000 in central tier of western States, and 83/1,000 in the northwestern tier of States (Knowlton and Stoddart 1983). Coyote densities as high as 5/mi^2 have been reported in the Southwest (Voigt and Berg 1999). Knowlton (1972)

4 All literature citations reported in km^2 have been converted to mi^2 for reader convenience and to maintain consistency.

estimated coyote densities West-wide to be an average of 0.5 to 1.0 per square mile over a large portion of the coyote's range. From predator surveys, Knowlton and Stoddart (1983) placed New Mexico in a band of high abundance. The opinions of WS Specialists that conduct PDM in New Mexico generally agree that coyote numbers are relatively moderate to high compared to low density areas. Although not substantiated by scientific field studies, Knowlton's (1972) 1.0 per square mile can be considered reasonable for the area and is very likely to be lower than true average densities across New Mexico. Thus, "high average" for the western U.S. (Knowlton 1972), especially considering that New Mexico had high scent post surveys (USFWS 1979), is assumed to be conservative for the area in question, but is used herein for analysis. Coyote population densities will vary depending on the time of year, food abundance, and habitat. Coyote densities in some studies have ranged from a low of 0.4/mi^2 prior to whelping when populations are low (just prior to the annual period of pup birth) and a high of 3.6/mi^2 when populations are high (just after the period of pup birth) (Pyrah 1984, Knowlton 1972) to a high of 5/mi^2. New Mexico is 121,598 mi^2 in size and the coyote is found throughout (Thompson et al. 1992). A conservative estimate of the coyote population for New Mexico, based on what we believe to be a conservative assumption of 1.0 coyote per square mile, is 120,000 pre-whelping. The post-whelping population would be about 320,000 if 2/3 bred and pairs had an average litter of 5.

2.1.1.2 Cougar. The majority of cougar complaints involve predation of livestock, pets, and, potentially, people. Comparatively less than coyotes, cougars were only responsible for almost $20,000 damage to livestock and wildlife, and a few human health and safety concerns in the 53 complaints reported to or verified by WS during FY03. Cougars From FY98 to FY03, cougars were responsible for an average of 49 complaints, about 6% of all mammalian predator complaints. Cougars predated 1,166 livestock as reported by WS cooperators in 2001. In addition, cougar predation on other wildlife species in New Mexico such as mule deer and antelope has created concern in some areas.

Cougars have an extensive distribution across western North America including New Mexico. This species is known by several other names including mountain lion, panther, puma, and catamount. Cougars inhabit many habitat types in New Mexico from desert to alpine environments, indicating a wide range of adaptability. They are closely associated with deer and elk herds, and other large hoofed mammals because they rely on these species for food. The cougar is a big game animal in New Mexico. NMDGF manages cougars including their damage. They issue depredation permits when needed per New Mexico regulations. WS has been contracted by NMDGF to assess damage and provide PDM for them as needed. Therefore, WS responds to requests for assistance concerning cougar depredations and evaluates and resolves these conflicts. From FY98 to FY03, WS received an average of 54 complaints annually for cougars for $36,000 in reported and verified damage. All of the damage value, with the exception of an occasional pet killed, was for predation of livestock. Some of the damage occurrences for cougars are for the protection of natural resources and human health and safety.

Female cougars typically breed for the first time between 22 and 29 months of age (Ashman et al. 1983) but initial breeding may be delayed until a territory has been established (Hornocker 1970). Cougars breed and give birth year round but most births occur during late spring and summer following about a 90 day gestation period (Ashman et al. 1983, Seidensticker et al. 1973, Robinette et al. 1961). One to six offspring per litter is possible, with an average of two to three young per litter.

Cougar density is primarily dependent on prey availability and intraspecific (*between or among members of the same species*) competition with other cougars. Prey availability is directly related to the habitat quality

of the prey species and this directly influences a cougar's nutritional health, and reproductive and mortality rates. Studies indicate that as available prey increases, so do cougar populations, but because cougars are territorial animals, the rate of population increase tends to decrease as cougar density increases, even though the prey availability continues to increase. As the cougar population density increases, the mortality rate from intraspecific strife, cannibalism, and dispersal into marginal quality, unoccupied habitats also increases. Shaw (1981) presented evidence that livestock such as sheep and calves provide a supplemental prey base that supports cougars through seasonal declines in their primary prey, deer. This allows an artificially high population levels to be reached, especially during times of low wild prey availability. However, the relationship of the cougar to its prey can help cougar populations to increase, but their relationship to other cougars is more a factor in determining the high density for a particular site; they typically do not reach density levels observed in a number of other wildlife species (Oregon Department of Fish and Wildlife 1993).

Cougar densities, based on a variety of population estimating techniques, range from a low of about 1/100 mi^2 (McBride 1976, Hemker et al. 1984) to a high of 24/100 mi^2 (Johnson and Strickland 1992). Cunningham et al. (1995) determined that cougar densities were about 75% higher in the portion of their study area which was subject to greater depredation control and sport hunting. Their estimates of density ranged from 4-7/100 mi^2. The average density estimate for western states was 7.5/100 mi^2 (Johnson and Strickland 1992). NMDGF (B. Dunn, NMDGF, *unpubl. data* 2005) estimated suitable habitat for cougars in New Mexico is between 23,300 mi^2 and 56,700 mi^2. The average (40,000 mi^2) would give New Mexico an estimated cougar population of 3,000. NMDGF currently believes that the cougar population is closer to about 2,200, which is 5.5/100 mi^2 (the average of Cunningham et al's (1995) estimate), but lower than Johnson and Strickland's (1992) West-wide estimate.

2.1.1.3 Bobcat. NMDGF is the agency responsible to oversee the management of bobcats since it is furbearer, but NMDA can provide assistance to livestock owners. Under the JPA and MOUs, WS works with NMDGF and NMDA to provide PDM to reduce their damage. WS provides NMDGF with information on damage and take as they are the management agency for the species. The confirmed and reported damage caused by bobcats in New Mexico during FY03 was to livestock in 84 damage occurrences. Total value of these losses was over $8,000 Efforts to resolve bobcat depredation problems in New Mexico are fairly high and target bobcats were taken on nearly 1 million acres of land by WS.

Bobcats are found in much of North America, excluding much of Canada and the East, but are most abundant in western States. They are typically associated with rimrock and chaparral habitat, but can be found in other habitats such as forests. They are found statewide in New Mexico and are fairly common. Bobcats reach reproductive maturity at approximately 9 to 12 months of age and may have one to six kittens following a two-month gestation period (Crowe 1975, Koehler 1987). Bobcat population densities appear to range between 0.1 and 7/mi^2 according to published estimates over the broad range of inhabited areas (Rolley 1999). They may live up to 14 years, but annual mortality is as high as 47% (Rolley 1985). The bobcat uses a total of approximately 46,976 mi^2 of habitat within New Mexican borders (Thompson et al. 1992). A conservative estimate of bobcat densities in suitable habitat for bobcats in New Mexico would be 0.5/mi^2, 5 times the low density estimate and more than 10 times lower than the high density estimate. This would yield a population estimate about 23,500 bobcats in New Mexico which will be used for the population impacts analysis in Section 4.2.1.2.

2.1.1.4 Skunks. Four species of skunks inhabit New Mexico, the striped, hooded, hog-nosed, and western spotted skunks. A fifth skunk may inhabit New Mexico, the eastern spotted skunk, but it is only a possibility;

records exist in the panhandle of Texas 50 miles from the border of New Mexico (Biota Information System of New Mexico (BISON-M) 2004). Skunks primarily cause odor problems around homes, potentially transmit diseases such as rabies to humans and domestic animals, and sometimes prey on poultry and their eggs. Skunks are primarily targeted to reduce these types of problems and these activities are only a minor part of WS's PDM activities. The majority of damage complaints usually are because of odor in and around residences. Most of the complaints are probably from striped skunks, but the other skunk species may be at fault. Skunks have also been responsible for a few other types of damage. Though skunks usually do not cause considerable damage, they are consistently responsible for the second most number of complaints averaging 113 from FY98-FY04; only 1 request for assistance each was received for a hog-nosed skunk and western spotted skunk during this time and none for the other two species. In FY03, striped skunks were responsible for 86 complaints, but only $725 in damage. Skunks are unprotected under New Mexico wildlife laws, and like the coyote, may be taken at any time.

All species of skunks have white on black pelage and have short, stocky legs with long claws on their feet for digging. Their most notable characteristic is the ability to discharge nauseating musk from their paired anal glands. The striped skunk is by far the most common in New Mexico. It is a large skunk, up to 10 pounds, with two white stripes down its back. The hooded skunk looks similar to a striped skunk but is sleeker, has a longer tail, and generally weighs less. Its pelage also has white stripes, but these can vary from large white stripes to almost none. The hooded skunk gets its name from a ruff of long hair on its upper neck, which distinguishes it from the other skunks. The hog-nosed skunk is similar in size to the striped skunk. It is distinguished by its elongated naked snout. It spends most of its time rooting for food. Hog-nosed skunks typically have one large white stripe down their back. The spotted skunks are the smallest typically not weighing much more than a pound and have a number of white spots covering their backs, sides, and head. The western spotted skunk is differentiated from the eastern by its smaller size. All of the skunks in New Mexico are classified as unprotected and damage to agricultural resources would fall under the jurisdiction of NMDA.

Striped skunks are found throughout the United States, including New Mexico and have expanded their range with the encroachment of people. Hooded skunks are common in Mexico, but are only found in the very southwest corner of New Mexico. Hog-nosed skunks are found in all but the northwest quarter and eastern-central parts of the State. Western spotted skunks are found in much of the state with the exception of the far eastern part of the State while the eastern spotted skunk is found possibly in far northeastern New Mexico. Spotted skunks, and to lesser extent hog-nosed, will climb to elude danger and search for food. Skunks are found in a variety of habitats including woodlands, grasslands, desert, and chaparral. The striped skunk, especially, is associated with farmland and urban areas whereas the others are mostly associated with rocky areas such as in canyons and outcrops, or grasslands (Rosatte 1999). Skunks eat a variety of food including small rodents, insects, fruits, and eggs, and sometimes kill poultry. Skunks nest in underground dens, hollow logs, under buildings and in rock crevices. During the winter they will go through periods of inactivity, especially while it is bitter cold. They typically are solitary, except they may communally roost in the winter, especially the females, for warmth.

The home range of striped skunks is not sharply defined over space and time, but is altered to accommodate life history requirements such as raising young, winter denning, feeding activities, and dispersal (Rosatte 1999). Home ranges reported in the literature averaged between 0.85 to 1.9/mi^2 for striped skunks in rural areas (Houseknecht 1971, Storm 1972, Bjorge et al. 1981, Rosaette and Gunson 1984). The range of skunk densities reported in the literature was from 0.85 to 67/mi^2 (Jones 1939, Ferris and Andrews 1967, Verts

1967, Lynch 1972, Bjorge et al. 1981). Many factors may contribute to the widely differing population densities. Habitat type, food availability, disease, season of the year, and geographic area are only but a few of the reasons (Storm and Tzilkowski 1982). Overall, the striped skunk has the densest population of the five species of skunks in New Mexico and uses a total of approximately 116,006 mi^2 of habitat within New Mexican borders (Thompson et al. 1992). Using the midpoint of densities (multiplication-wise), a density could be 7.5/mi^2 which would result in a population estimate about 870,000. However, using the lowest density estimate would result in a population estimate of about 99,000.

The hooded skunk is chiefly a low desert animal, but can be found in ponderosa habitat at higher elevations where it seems to prefer rocky slopes, bases of cliffs, or rocky sides of arroyos, often along watercourses. The hooded skunk is found in 7,534 mi^2 of habitat within New Mexican borders (Thompson et al. 1992). Not much is known about hooded skunks because few studies have been conducted on them (Roseatte 1999). In a baiting study conducted by WS in Arizona, WS in a study area of about 54 mi^2 using 90 cage traps for 10 consecutive days (minimal coverage), captured 16 hooded skunks or about 0.3/mi^2, 9 striped skunks (0.17/mi^2), and 2 western spotted skunks (0.04/mi^2) suggesting that populations of hooded skunks have higher densities than striped skunks in some areas,. Therefore, densities of hooded skunks are at least likely to be similar to striped skunks in appropriate habitat. Thus, New Mexico at 0.85 hooded skunks/mi^2 would have a population of 6,400 hooded skunks.

Hog-nosed skunks occur in southern New Mexico from creosote desert to at least the pine-oak forest, and are most common in warm woodland, grassland, and desert in their preferred habitat of rocky areas for denning (Roseatte 1999). Residential areas and farmlands are classified as secondary habitat (Thompson et al. 1992). The hog-nosed skunk uses a total of approximately 44,145 mi^2 of habitat within New Mexican borders (Thompson et al. 1992). Not much is known about hog-nosed skunks because few studies have been conducted on them (Roseatte 1999). The low density of striped skunks, being somewhat similar in size to striped skunks, would likely provide a conservative estimate of the hog-nosed skunk population for New Mexico at 37,500.

Spotted skunks are found in diverse habitats over the entire state preferring rocky canyons and outcrops in woodlands and prairies, especially shrub habitats in broken country. They often take advantage of the food and cover in agricultural areas. Spotted skunks make their dens in cracks and crevices among rocks, woodrat nests, hollow logs, burrows under large rocks, and sometimes under buildings. Unlike striped skunks, spotted skunks are adept climbers. They are almost entirely nocturnal and seldom are seen in the daytime. A major difference in the two species are their breeding season; eastern's breed in spring whereas westerns breed in fall. Additionally, the two species are geographically isolated, and though once believed to be the same species, is now recognized as two separate species. Both species exhibit delayed implantation of the eggs meaning that they still give birth in the spring following a 50-65 day gestation period. Densities of spotted skunks averaged about 5.7/mi^2 of habitat in Iowa. The eastern spotted skunk is found, at most in the far northeastern part of New Mexico and is not likely widespread, if at all. The western spotted skunk is found in about 96,724 mi^2 of habitat within New Mexico (Thompson et al. 1992). It is likely that this species is less common than the striped skunk. If over their range in New Mexico, the spotted skunk averaged a quarter that of striped skunks (similar to the capture in the WS study in Arizona discussed above), or about 0.2/mi^2, then New Mexico would have a conservatively estimated population of 19,300 western spotted skunks.

2.1.1.5 Black Bear. Black bear are protected as big game in New Mexico and, as such, NMDGF manages their population. NMDGF has decision authority over black bear damage requests and calls on WS to take

bear when the need arises from a damage situation. NMDGF contracts with WS to conduct bear damage management. WS receives occasional calls from individuals and NMDGF to remove bears that have killed livestock (i.e., sheep and lambs), caused property damage, or threatened human health and safety. They were responsible for 21 damage complaints and $5,100 in reported and verified damage in FY03, with an average of 28 complaints from FY98 to FY03.

Black bears can be found throughout much of North America, including the Rocky Mountains. Female black bears reach reproductive maturity at approximately 3.5 years (Kohn 1982, Graber 1981). Following a 7-8 month gestation period, they may have one to five cubs (Rogers 1976, Alt 1981, Kolenosky and Strathearn 1999). Juvenile black bear annual mortality ranges between 20 and 70 percent, with orphaned cubs having the highest mortality (Kolenosky and Strathearn 1999). Natural mortality in adult black bears is approximately 10-20 percent per year (Fraser et al. 1982). In Colorado, the annual mortality rate was 0.44 for cubs, 0.06 for yearlings, 0.15 for subadults, and 0.12 for adults. Black bears can live up to 25 years (Rogers 1976). Black bears are found in all the montane forests in New Mexico including shortgrass plains, sycamore, cottonwood, rabbitbrush, oak woodland, pinon-juniper, chaparral, and coniferous forest. Bears will eat a variety of foods including grass, fruits, nuts, carrion, insects, bees (especially the larva) and garbage; they may overturn rocks and logs looking for grubs and insects or small rodents. Recent research indicated they may also be a more efficient predator of large game than was previously believed (Pederson 1988) along with livestock. Lee (1967) estimated the New Mexico black bear population in 1967 was 3,000, and approximately static. He felt that this represented some increase in numbers of bears since the year 1927, when the animals first received legal protection. Some 300 bears are killed each year by hunters (Findley et al. 1975). Their density will vary between 0.3-3.4/mi^2, depending on habitat (Kolenosky and Strathearn 1999). In the southwestern U.S., black bear population densities have been documented at 1/mi.^{2} (LeCount 1982). Black bears are found throughout the western two thirds of the State in forested habitat or about 15% of New Mexico. At the lowest density estimate of 0.3/mi^2, this would result in an estimate of about 5,500. NMDGF, though, currently estimates the population at 6,000 or 0.33/mi^2 (R. Winslow, NMDGF, pers. comm. 2005).

2.1.1.6 Feral Cat. WS periodically takes feral cats in PDM activities. Feral cats are fairly common throughout New Mexico. From FY98 to FY04, WS received a yearly average of 16 complaints involving feral cats, most for nuisance strays, but also for predation of poultry. Primary responsibility for feral cat control rests with county and local authorities. WS responds only to requests from these entities as well as health departments to target feral cats. WS personnel are authorized to control feral cats to protect livestock, poultry, natural resources and human health and safety when requested by the sheriff or other authority. Feral cats are not part of the native environment, and left abandoned in the wild are often considered an ecological pest and very efficient predators. They are commonly found feral throughout many parts of New Mexico.

2.1.1.7 Feral Dog. Feral and free-roaming dogs are not that common in New Mexico, but problems from them can be extensive. Domestic dog predation of livestock and poultry is not uncommon and from FY98-FY03, WS responded to an average of 15 requests for assistance annually. In FY03, free ranging dogs were responsible for 10 reported or verified damage incidences with a value of almost $8,000 in damages. They also sometimes cause health and safety concerns to people, especially children. Free-roaming dogs are also known to prey on native wildlife such as deer and upland game. Primary responsibility for dog control rests with county and municipal authorities. It is WS policy to respond only to requests for controlling dogs that come from these local authorities, (i.e., county sheriff, municipal police, or health department). Since WS

only responds at the request of local agencies, and many have animal control officers, WS receives relatively few calls concerning free-roaming or feral dogs and, thus, WS records only reflect minor damage for them. Feral dogs are not part of the native environment, and left abandoned in the wild are often considered an ecological pest.

2.1.1.8 Raccoon. Raccoons are a furbearer in New Mexico and NMDGF is responsible for oversight of raccoon management. They are abundant throughout North America, except Canada and the Rocky Mountains and Great Basin regions. They are typically associated with waterways and forested habitats, but are especially common in urban areas. In New Mexico, they are found mostly in urban areas, along waterways and in forests in the less arid portions of New Mexico; they sometimes can be found a long way from water in a variety of habitats including desert scrub. Raccoons are one of the most omnivorous of animals, feeding on carrion, garbage, birds, mammals, insects, crayfish, mussels, other invertebrates, a wide variety of grains, various fruits, other plant materials, and most or all foods prepared for human or animal consumption (Sanderson 1999). Raccoon damage problems, including human health and safety concerns, were reported on an average of 12 times annually from FY98 to FY04.

Raccoon make use of approximately 12,097 miles of riparian habitat within New Mexico or 24,900 mi^2 (Thompson et al. 1992). Twichell and Dill (1949) reported one of the highest densities where 100 raccoons were removed from a winter tree den area on 101 acres of a waterfowl refuge in Missouri. Other studies have found raccoon densities that ranged from 9.3/mi^2 to 80/mi^2 (Yeager and Rennels 1943, Urban 1970, Sonenshine and Winslow 1972, Hoffman and Gottschang 1977, and Rivest and Bergerson 1981). Densities in New Mexico average towards the lower end of the range over large tracts of land similar to that found in Colorado, 1.3-8.3/mi^2 (Fitzgerald et al. 1994). Considering their range, and using 1.3/mi^2, a reasonable estimate of the number of raccoons in New Mexico would be 32,000.

2.1.1.9 Foxes. NMDGF is the agency responsible to oversee the management of foxes in New Mexico, classified as a furbearers. Gray fox tend to prefer coniferous forests, chaparral and rimrock country with scattered pinyon-juniper and agricultural habitats. They primarily feed on small mammals, birds including poultry, mast, and insects. They have 3-7 pups and den in hollow logs, under rocks, and sometimes in underground dens. Gray fox occupy about 39,548 mi^2 of habitat within New Mexico (Thompson et al. 1992). Published estimates of gray fox densities range form 3.1-5.4/mi^2 with densities probably lower over broader areas (Fritzell 1999). Since gray fox occur spottily throughout their range, a density of 1.0/mi^2 over its range (a third of the lowest density estimate), would provide a conservative estimate of about 40,000 gray fox in New Mexico. Gray fox in New Mexico cause little damage and have only been responsible for an average of $50 damage in 1 request for assistance from WS, mostly to poultry from FY00 to FY04.

Red fox are found throughout much of North America, but are more uncommon in New Mexico. In the early part of the 1900s, red foxes were essentially limited to the northern mountains of New Mexico in the coniferous forests and alpine tundra. Their range has expanded into agricultural areas of New Mexico, most likely as a result of red fox introductions from abandoned fur farms and subsequent expansion. Red fox eat mostly small mammals, birds, insects and mast, and will take small livestock and poultry. Of the foxes and where abundant. red fox typically create the most complaints and usually involve livestock. Red fox have a home range of 1-2 mi^2, but often travel outside. Red fox usually den on slopes in porous soils and have 1 litter per year of 4-9 pups. Densities range from 0.3 (tundra)-80 (urban with abundant food)/mi^2 in studies (Voigt 1999). An average density for New Mexico, where yet they have to become well-established, might be conservatively estimated at 0.3/mi^2, the lowest density estimate. In New Mexico, they occupy 21,007 mi^2

of habitat (Thompson et al. 1992), thus a conservative estimate would be 7,000 red fox.

Swift and kit foxes, although similar species, are found in entirely different habitats. Swift fox are a grasslands species whereas kit fox occupy a desert niche (sometimes on the fringe of agricultural lands). Both species prefer areas where the soils are loose-textured and they can dig underground dens which are used throughout the year (O'Farrell 1999, Scott-Brown et al. 1999, BISON-M 2004). These foxes are most common in areas that support large populations of prey such as rodents, especially kangaroo rats (*Dipodomys* spp.) and deer mice (*Peromyscus* spp.), birds, and insects. They reach reproductive maturity between 10 and 22 months of age and litters average 3-5 pups. Kit fox are found in most of the southwest half of New Mexico, whereas the swift fox is found in east central New Mexico. Kit fox and swift fox occupy 51,049 mi^2 and 34,705 mi^2 of habitat within New Mexico (Thompson et al. 1992). Population density information is poorly understood for both species. Studies, in California and Utah, found kit fox densities anywhere from 0.25-6.0/mi^2 (O'Farrell 1999); a density of 0.25/mi^2 for New Mexico would result in a population of 12,800. Not much is known for swift fox densities except that they have been found as high as 10/mi^2 in eastern Colorado (Scott-Brown et al. 1999). The Colorado Division of Wildlife has recently funded research on the swift fox to determine density indices in eastern Colorado (Finley 1999, Finley et al. 2005). These studies found in 2004-2005 an average density of 0.4/mi^2. For New Mexico, 0.4 swift fox/mi^2 would result in a population estimate of 13,900. However, WS receives few requests for these species because neither of these two species cause many problems.

2.1.1.10 Badger. Badgers are classified as a furbearer in New Mexico and managed by NMDGF. Badgers are found throughout most of the western States and are found in New Mexico at moderate densities. They typically inhabit open grasslands and deserts. Badgers are considered to occur in nonforested areas throughout New Mexico but are most common in lower elevation grasslands. Their distribution is typically associated with fossorial prey such as prairie dogs. The smallest and largest estimated sustainable yield rates mentioned in the literature are 18% and 33%, respectively (Cook 1986); however, Boddicker (1980) found that badger populations can safely sustain an annual harvest rate of 30-40% annually. The badger uses a total of approximately 81,885 mi^2 of habitat within New Mexico (Thompson et al. 1992). Density estimates range from 1/mi^2 to 13/mi^2 (Messick 1999). Using a very conservative estimate 0.5/mi^2 (half the lowest density estimate), New Mexico would have 41,000 badgers. WS occasionally takes badgers as target species, most often for the protection of rangeland, pasture, and cropland damage. In FY03, badgers were responsible for $1,200 damage in 2 occurrences, and have averaged 4 occurrences from FY98 to FY04.

2.1.1.11 Ringtail. Ringtails are protected as a furbearer in New Mexico and NMDGF has management authority for them. The ringtail is found in most of New Mexico but is most common in the southern part of the State. It is found in rimrock, desert, and rocky ridge habitats in close association with water. Ringtails feed on small mammals, birds, lizards, insects, and mast. Because of their habitat choice and secretive nature, ringtails seldom become a problem, but have been known to become nuisance in and around human habitations. WS receives an average of one request annually (FY98-FY04) mostly involving those that have gotten into houses. The ringtail uses a total of approximately 90,594 mi^2 of habitat within New Mexican borders (Thompson et al. 1992). Densities of ringtails in the literature vary greatly from 0.2/mi^2 to 51.8/mi^2 and many were made prior to 1950; estimates from a Utah study in the late 1970s, with similar habitat to some areas in Colorado where they occur was 3.9-7.5/mi^2 (Kaufmann 1999). Using the lower density estimate of 0.2/mi^2, New Mexico would have an estimated 18,100 ringtails which is likely very conservative.

2.1.1.12 Opossum. The opossum is not historically native to New Mexico, and was first recorded there in

1960 (Findley et al. 1975). They were likely introduced, often kept as pets, and have now been recorded in 7 counties. They typically are associated with riparian areas and inhabit deciduous woodlands, cottonwood forests, pinyon-juniper woodlands, farmlands, old fields, grasslands, marshlands, agricultural and forested edges, and desert plains. Currently they are found along about 275 miles of riparian habitat or about 550 mi^2 of habitat within New Mexico. Their density ranges from 1.3/mi^2 to 20.2/mi^2 with an average of 10.1/mi^2 (Seidensticker et al. 1999). Using the low density estimate of 1.3/mi^2, about 720 would inhabit New Mexico. However, because the opossum is not native, it could be considered an invasive species, and thus any decline in their population could be considered benefitting the environment.

2.1.1.13 Weasels. The long- and short-tailed weasels are found in New Mexico, both classified as furbearers. NMDGF has management authority over the weasels. The short-tailed weasel is found mostly in northern North America and is rare in northern New Mexico at high altitudes in mixed coniferous forest covering only about a 6,882 mi^2 area. Densities for short-tailed weasels varied from 10/mi^2 to 16/mi^2 in preferred habitats (Fagerstone 1999). At their low density, the short-tailed weasel population would be 69,000. The long-tailed weasel is more common and found in much of the continental U.S. including most of New Mexico, excluding southern portions. They are found in a wide variety of habitats, usually brushy and rocky, and in close association with water. The long-tailed weasel occupies about 106,240 mi^2 of habitat in New Mexico. Long-tailed weasels are found at densities of 1/mi^2 in large areas including non-preferred habitats to as many as 98/mi^2 in appropriate habitat (Fagerstone 1999); using the most conservative estimate, New Mexico would have a minimum of 106,000 long-tailed weasels. Both primarily feed on small rodents WS occasionally receives damage complaints for weasels, and invariably it is for the long-tailed weasel, and most always for poultry predation. WS did not receive a request for assistance for either species from FY98 to FY04.

2.1.1.14 Feral Domestic Ferrets. The domestic or European ferret is frequently sold as pets and sometimes released into the wild or escape. WS gets only a few requests for assistance for ferrets. Once feral, they feed on small rodents, rabbits, and potentially poultry to survive. Feral ferrets are not part of the native environment, and left abandoned in the wild are often considered an ecological pest. They are very uncommon in the wild.

2.1.1.15 Mink. NMDGF is the agency responsible to oversee the management of mink in New Mexico as they are classified as furbearers. Mink are found across much of northern North America and in scattered areas of northern New Mexico. Mink were thought to have been extirpated, but some were found in 1988. They are associated with lakes, streams, and marshes where they feed on small mammals, birds, eggs, fish, insects, and amphibians. Damage complaints for mink are usually received for poultry and fish predation. WS has not received a complaint for this species in recent years. Mink, typically found within a half mile of riparian habitat cover about 1,069 mi^2 in New Mexico (Thompson et al. 1992). They have had reported densities of 8.5/mi^2 to 22/mi^2 of wetland habitat and densities of 2.5 to 6 per mile of stream shoreline, but methods of estimating their density have varied greatly and have inaccuracies (Eagle and Whitman 1999). In northwestern Colorado, mink density was estimated at 1.7/mi^2 (McKean and Burkhard 1978 *cited in* Fitzgerald et al. 1994). Using the low density of 1.7/mi^2, New Mexico would have a population of 1,800 mink. WS did not receive any requests for assistance for mink from FY98 to FY04.

2.1.1.16 Marten. Although widespread in North America, pine marten populations had suffered declines in localized areas due to over-exploitation for furs and loss of habitat from lumbering operations and other activities. Martens occur in spruce-fir forests and marginal alpine habitat where it feeds on small mammals,

particularly red squirrels (*Tamiasciurus douglasii*), birds, insects and masts. They climb and spend much of their time in trees, usually avoiding open areas. Typically the only damage that marten do is raiding mountain homes and cabins. WS did not receive any requests for assistance for marten from FY98 to FY04. In New Mexico, this animal had probably never been common in the historic period and is only a rare resident. The marten's potential range in New Mexico is probably less than 2,000 mi^2. Density studies basically found a range of 1/mi^2 to 5/mi^2 (Strickland and Douglas 1999); at the low density estimate, 2,000 marten would potentially inhabit New Mexico. The marten is a State listed threatened species, and therefore, WS would work with NMDGF if one were found that was causing damage.

2.1.1.17 White-nosed Coati. In New Mexico, the coati inhabits canyons characterized by riparian vegetation such as sycamore and oaks. They climb trees easily and rapidly and often take to trees as a means of escape from predators. They are usually found near streams, creeks or some source of water and typically live in natural retreats such as rock crevices, cavities among tree roots, and caves or mines. Coatis often travel together in bands, and these bands move slowly along, rooting in litter, crevices, and other places for food, both on the ground and at times in trees. They are primarily diurnal and quite omnivorous, eating fruits, nuts, roots, insects and eggs. Coatis feed extensively on soil-inhabiting invertebrates, lizards, snakes, carrion, rodents, nuts and fruits of native trees, prickly pear, and yucca. They can cause damage to poultry and orchards, but damage is mostly very localized where it occurs. Coatis are susceptible to predation from cougars, jaguars, and other large predators. They climb trees easily and rapidly, and often take to trees as a means of escape from predators. Coatis make use of an estimated 7,728 mi^2 in southwestern New Mexico (Thompson et al. 1992). Little is known about coati densities, but have been found at densities of 0.6/mi^2 in Central America (Kaufmann 1999); at this density, about 4,600 would be found in New Mexico. WS has not had a complaint involving this species in the last 10 FYs, and does not anticipate more than a few calls per year because this species is not often involved in damage.

2.1.2 Effects on Nontarget Species Populations, Including T&E Species

A common concern among members of the public and wildlife professionals, including WS personnel, is the possible impact of PDM methods and activities on nontarget species, particularly T&E species. SOPs of WS include measures intended to reduce the effects of PDM on nontarget species populations and are detailed in Chapter 3. The effectiveness of PDM methods to capture target species, yet reduce capture of nontarget species may vary widely depending on local circumstances at the time of application (e.g., target and nontarget species are similar in weight and in the same area). Some methods may be more or less effective or applicable depending on weather conditions, time of year, biological considerations, economic considerations, legal and administrative restrictions, or other factors.

Table 4. All nontarget species taken by WS during PDM for FY98 to FY04 on all land classes.

Nontarget Species Killed by WS in FY98-FY04																
YEAR	FY98		FY99		FY00		FY01		FY02		FY03		FY04		Average	
Species	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed
PREDATORS																
Striped Skunk	73	-	40	-	79	-	62	-	31	-	17	-	9	-	44	0
Gray Fox	23	22	20	9	42	34	30	32	25	18	78	21	25	20	35	22
Feral Dog	56	7	49	11	19	4	20	10	11	10	13	9	8	4	25	8
Kit Fox	32	4	22	12	24	5	18	2	26	0	14	2	23	2	23	4

Nontarget Species Killed by WS in FY98-FY04																
Swift Fox	42	-	16	-	8	-	10	-	4	-	12	-	10	-	15	0
Badger	12	5	7	4	12	21	13	6	8	4	11	5	11	13	11	8
Bobcat	6	2	5	9	10	4	3	-	5	6	1	2	3	0	5	3
Raccoon	4	1	4	1	2	5	6	3	7	-	1	-	2	2	4	2
Coyote	-	-	6	-	4	-	-	-	-	-	-	-	-	-	1	0
Cougar	2	-	1	1	2	-	1	-	-	-	-	-	2	-	1	0
Black Bear	-	1	-	-	1	-	-	-	3	1	1	-	-	1	1	0
Red Fox	2	-	-	-	-	-	-	-	1	-	-	-	1	-	1	0
Feral Cat	-	6	-	13	-	2	-	2	-	8	3	25	-	2	0	8
Hog-nosed Skunk	-	-	-	-	1	-	1	-	-	-	-	-	-	-	0	0
Spotted Skunk	-	-	-	-	-	-	1	-	-	-	-	-	-	-	0	0
OTHER SPECIES																
Turkey Vulture	-	-	-	-	-	1	-	-	-	-	-	-	-	-	0	0
American Crow	3	-	1	-	2	-	-	-	-	-	-	-	-	-	1	0
Common Raven	1	-	3	-	-	-	-	2	2	-	-	-	5	-	2	0
Scrub Jay	-	-	1	-	-	-	-	-	-	-	-	-	-	-	0	0
Mule Deer	4	4	4	6	2	2	2	-	6	3	-	2	1	0	3	2
Pronghorn	1	2	2	2	-	1	1	-	1	1	-	-	-	-	1	1
Javelina	1	-	1	-	-	2	-	-	-	-	1	-	-	-	0	0
Feral Hog	-	-	1	-	-	-	-	-	-	-	-	-	-	-	0	0
Jackrabbit	6	-	8	1	4	4	2	-	2	-	-	-	1	1	3	1
Porcupine	50	1	20	1	22	11	15	1	29	3	9	-	4	1	21	3
Ground Squirrel	2	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Norway Rat	-	-	-	-	-	-	-	-	1	-	-	-	-	-	0	0
Total	320	55	211	70	234	96	185	58	162	54	161	66	105	46	197	64

2.1.2.1 Nontarget Species Taken by WS. From FY98 to FY03, WS took 27 different nontarget species, averaging 18 different species per year (Table 4). Most nontarget species taken during PDM (15 of 27) are other predator species that were not targeted during a specific operation. Information for these predators was discussed in 2.1.1. Only 4 other species averaged more than one killed per year, the porcupine (*Erethizon dorsatum*), black-tailed jackrabbit (*Lepus californicus*), mule deer, and common raven (*Corvus corax*). These species are of similar or more weight and size than the species mostly targeted and can be taken with several of the methods used. All of these species are found throughout New Mexico in their appropriate habitat. Porcupines are mostly found in coniferous forest habitats, though some can be found in agricultural areas and shrublands far away. Black-tailed jackrabbits are found at lower elevations (typically below ponderosa pine zone)in shrub and rangelands. Mule deer are prevalent throughout the State, preferring areas with a diversity of habitats. All other nontarget species taken are relatively common in New Mexico, either locally or statewide.

2.1.2.2 Potential T&E Species that Could Be Taken in PDM by WS. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or measures to reduce the potential for take. WS conducted a Biological Assessment (WS 2003) of the potential for wildlife damage management, in general, to impact the species listed in New

Mexico. USFWS, consulted under Section 7 of the ESA, concurred with the findings of the Biological Assessment in a letter to WS. The only differences from the list presented in 2003 and the current list for 2005 used for this EA are that black-tailed prairie dogs (*Cynomys ludovicianus*), a candidate, and the mountain plover (*Charadrius montanus*), a proposed threatened species, were removed from the federal list. The U.S. District Court in New Mexico (*Forest Guardians, et al. v. Forsgren*; US District Court of New Mexico CIV 04-0143 RB/DJS) determined that Canada lynx were not a federally listed species in New Mexico because lynx were not included in the States listed in the U.S. Distinct Population Segment. Additionally, the last of the experimental Gray's Lake population of whooping cranes that wintered in New Mexico died and are no longer listed in New Mexico. The Biological Assessment covered all species listed in New Mexico, but did not reinitiate consultation for those species already covered under a BO issued for that species from USFWS, but stated that WS is continuing to abide by the Reasonable and Prudent Measures and Alternatives and Terms and Conditions already in place. USFWS agreed that these were still operable. The results of the biological assessment and a description of measures established to reduce the potential threats are presented in Chapter 3 or can be found in the BO issued for a particular species. The National WS Program began a new nationwide consultation to replace the 1992 BO (USDA 1997) which will guide PDM activities nationally and supercede New Mexico's Biological Assessment when it is complete.

In all, the Federal T&E species and Candidate list for New Mexico includes 5 mammals, 8 birds, 2 reptiles, 2 amphibians, 14 fish, 11 invertebrates, and 13 plants. The New Mexico T&E species list includes an additional 12 mammals, 26 birds, 13 reptiles, 5 amphibians, 11 fish, and 16 invertebrates. PDM will have no effect on listed amphibians (7 spp.), fish (25 spp.), invertebrates (28 spp.), and plants (13 spp.). WS's PDM activities will have no effect on listed bats (4 spp.), shrews (2 spp.), small rodents (5 spp.), pelicans (1 spp.), cormorants (1 spp.), falcons (2 spp.), doves (1 spp.), nightjars (1 spp.), cuckoos (1 spp,) owls (3 spp.), hummingbirds (5 spp.), woodpeckers (1 spp.), trogons (1 spp.), passerines (10 spp.),and all reptiles except the ridge-nosed rattlesnake and gila monster (12 spp.). Table 5 gives the listed species in New Mexico that could be affected by PDM, adversely or beneficially.

Table 5. New Mexico Federal and State listed T&E, and candidate species.

SPECIES	Scientific Name	Status	Locale	Habitat	Diet	PDM
MAMMALS						
Black-footed ferret*	*Mustela nigripes*	FE	All	GR	S	-, 0, +
Marten	*Martes americana*	ST	N	F	S	-, 0
Mexican gray wolf	*Canis lupus baileyi*	XN FE SE	SW	FR	L	-, 0
Jaguar	*Panthera onca*	FE SR	Hidalgo	F	LS	-, 0
White-sided jackrabbit	*Lepus callotis*	ST	SW	DG	G	-, 0, +
Desert bighorn sheep	*Ovis canadensis mexicana*	SE	SW	DF	G	0, +
BIRDS						
Piping plover	*Charadrius melodus*	FT SE	C/NC	W	AI	0, +
Interior least tern	*Sterna antillarum*	FE SE	S/NC	W	AI	0, +
Bald eagle	*Haliaeetus leucocephalus*	FT ST	All	FW	ACs	-, 0
Gould's Wild Turkey	*Meleagris gallopavo mexicana*	ST	Hidalgo	F	GIM	-, 0, +
White-tailed ptarmigan	*Lagopus leucurus*	SE	S	G	S	0, +
Lesser prairie-chicken	*Tympanuchus pallidicinctus*	FC	E	GR	GI	-, 0, +
REPTILES						
Gila monster	*Heloderma suspectum*	SE	SW	D	CI	-, 0
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	FTH ST	Hidalgo	F	Si	-, 0

Diet - Capitals = large proportion of diet - Lower case = small proportion of diet. * - Believed extirpated

STATUS	HABITAT	DIET	PDM - Impacts
F - Federal	D - Low desert scrub	A - Aquatic-fish/invertebrates	(-) - Negative
S - State	F - Forests/riparian borders	C- Carrion	0 - none
E - Endangered	G - Grassland/meadow	G - Grains/grass/seeds	(+) - Positive
T - Threatened	R - Range/sage/high desert	I - Invertebrates/insects	
C - Candidate	W - Wetland/marsh/sandbar	M - Mast/fruit & nuts	
H - Designated Critical Habitat		S - Small vertebrates (i.e. rodents, birds)	
X/N - Nonessential/Exp. Pop.		L - Large Vertebrates	

PDM could potentially have a negative effect on 10 listed species in New Mexico. Five of these are Federally listed and 1 candidate, the ferret, wolf, jaguar, bald eagle, ridge-nosed rattlesnake, and lesser prairie-chicken. However, measures are in place that either nullifies the likelihood of take, or reduces it considerably; WS has incidental take statements under Section 7 from USFWS in a BO with Reasonable and Prudent Measures and Alternatives with Terms and Conditions that even though take may be minimized, the potential exists to still take a T&E species. On the other hand, PDM could also positively impact 8 species because these species are killed by predators and the removal of predators from T&E species habitat reduces the numbers lost to predation. Of these, four, the ferret, piping plover, least tern, lesser prairie-chicken are federally listed. Following is background information on those species that potentially could affected, positively or negatively, by some aspect of PDM. It should be noted that WS did not take any T&E species, or any other of the protected species given below, in New Mexico from FY98 to FY04.

Black-footed Ferret. The black-footed ferret once was found among prairie dog colonies of New Mexico, though it was likely fairly rare (BISON-M 2004). The black-footed ferret has not been confirmed in New Mexico since 1934, but a few unverified sightings have occurred since that time. They were thought to be extinct nationally with the last known captive ferret dying in captivity in 1979. In 1981, a new population was found in northwestern Wyoming which was subsequently taken in to captivity when many of these ferrets began dying of distemper. The captive breeding program that was established with the 19 remaining ferrets and have produced over 3,000; they have been reintroduced into 6 states. Populations have been started in northwestern Arizona and Colorado. The black-footed ferrets appear to be surviving. It is doubtful, though remotely plausible, that an actual wild population still exists in New Mexico today. Black-footed ferrets could be negatively and positively affected by PDM. Leghold traps, gas cartridges, and M-44s are a concern. However, these can be used appropriately to cause no effect. WS has never taken a black-footed ferret. On the other hand, PDM can benefit the black-footed ferret; USFWS will not release ferrets unless PDM has been conducted because in their first release 34 of 39 ferrets were killed by predators.

Marten. Marten in New Mexico are in the southern part of their range in the U.S. in forested and some alpine habitats in the San Juan and Sangre de Cristo mountains of north-central New Mexico (Section 2.1.1.16). Martens occur in spruce-fir forests and marginal alpine habitat in the . Limited distribution in northern New Mexico, habitat loss (i.e., logging), and historic over-harvesting have likely played a role in their rarity. Several tools used in PDM have the potential for taking them including leg-hold traps, cage traps, small snares, and M-44s. WS has not taken a marten, target or nontarget, as long as MIS records have been kept.

Mexican Gray Wolf. The gray wolf was extirpated from much of the lower 48 continental United States by the 1930's. Gray wolves were once found in New Mexico, but disappeared as a result of a campaign to rid the United States of livestock destroyers that was started in the late 1800s. The last Mexican wolves taken in the United States were in the 1970s and in Mexico in 1980s (BISON-M 2004). Although, reports are received periodically of sighted wolves, most are likely wolf dog hybrids intentionally released by owners.

A captive breeding program began in 1977 when wolves were captured in Mexico. By the 1990s, USFWS believed that wolves were extirpated from the United States. However, the Mexican wolf is still listed as endangered and possibly wild wolves still exist in Mexico and could wander into the United States. However, none have been found in Mexico and they are believed to have been extirpated. Thus, USFWS, did not allow for incidental take of wild wolves in New Mexico. The Mexican subspecies was reintroduced into Arizona and New Mexico (the Southwestern DPS) as outlined in the USFWS Wolf Recovery Plan as nonessential experimental populations from captive bred stocks. Wolves outside the designated experimental population area, including those believed to have originated from the nonessential experimental population, but that have wandered out of the experimental population area, retained endangered species status. Many tools used in WDM for large predators such as leghold traps, snares, M-44s, and aerial hunting have the potential of taking a wolf. WS follows the conservation measures established in the 1998 Biological Opinion and Conference Opinion issued by USFWS (1998a) ; this was actually two opinions - a "BO" for "naturally occurring Mexican wolves" and a "Conference Opinion" for the reintroduced nonessential/experimental Mexican wolves. WS has not taken an incidental wolf in at least the last 35 years.

Jaguar. The jaguar is the largest species of cat now native to the Western Hemisphere. Jaguars are large muscular cats with relatively short massive limbs, a deep-chested body, and cinnamon-buff in color with many black spots. The jaguar prefers a warm tropical climate, is usually associated with water, and is only rarely found in extensive arid areas. Its range in North America includes Mexico and portions of the southwestern United States. A number of records of jaguars are known for New Mexico, primarily in Hidalgo County. Records of the jaguar New Mexico have been attributed to the subspecies *Panthera onca arizonensis*. The historical range of the jaguar included portions of Arizona, New Mexico, and Texas. The current range is from central Mexico through Central America and into South America as far as northern Argentina. It is felt that the United States no longer contains established breeding populations which probably disappeared in the 1960s. Brown (1983) presented an analysis suggesting that at least into the 20th century a resident breeding population of jaguars was present in the southwestern United States. In March 1996, the presence of a jaguar was confirmed through photographs made in the Peloncillo Mountains of Arizona and New Mexico (Glenn 1996). USFWS (1999b) recognized that the jaguar continues to occur in the American Southwest as an occasional wanderer from Mexico. The jaguar was not part of the 1992 BO (USDA 1997) because it was not listed until 1997. However, WS initiated consultation and USFWS issued a BO and amendment in 1999 (USFWS 1999 a, b). USFWS issued a *"may effect, but not likely to jeopardize"* opinion with reasonable and prudent alternatives and measures to avoid take. WS has not taken a jaguar incidentally.

White-sided Jackrabbit. This State threatened hare occurs in the United States only in extreme southern Hidalgo County, where it has been confirmed only in the Animas and South Playas valleys (Hubbard et al. 1985). The white-sided jackrabbit appears to be a virtual obligate of grasslands (Conley and Brown 1977). Although the species shares its range with the black-tailed jackrabbit, the two generally occupy different habitats (Conley and Brown 1977). In areas of pure grassland, the white-sided jackrabbit is found, but not the black-tailed jackrabbit. In areas where grassland is invaded by shrubs and forbs, blacktails outnumber white-sided jackrabbits proportional to the extent of invasion. The white-sided jackrabbit feeds primarily on nutgrass (*Cyperus rotundus*) and various grasses, including buffalo-grass (*Buchloe dactyloides*) and other shortgrass plains species (Bednarz 1977 *cited in* BISON-M 2004). PDM methods in occupied habitat that could take them are leghold traps and snares. WS avoids taking white-sided jackrabbits by using pan-tension devices on leghold traps and stops on snares when they are used in occupied habitat. WS has not taken a white-sided jackrabbit incidentally in at least the last 10 FYs. The take of black-tailed jackrabbits has

decreased with the use of pan-tension devices on leghold traps for coyotes.

Desert Bighorn Sheep. The State endangered desert bighorn occurs at a few sites in southwestern New Mexico. Their populations have declined at most locations, but they have been reintroduced to several areas. They mostly inhabit arid, rocky mountains, mainly in open habitats. Sheep prefer areas of grass and desert shrub as well as live oak communities. Most bighorn sheep use cliffs, especially for feeding and bedding, which keeps them away from most predators. Mountain mahogany was the most frequently eaten food plant among other shrubs and forbs. Desert bighorn tend to be within 1 mile of a water source. Desert bighorn are not affected by PDM methods, primarily because the areas they inhabit are rugged with limited access. However, PDM, especially reduction of cougars and coyotes in their areas, can benefit them. WS has conducted cougar control for the protection of desert bighorn sheep in New Mexico. Cougar damage management has been conducted to protect the endangered Sierra Nevada Bighorn Sheep in California (USFWS 1999c).

Bald Eagle. Bald eagles are generalized predators/scavengers primarily adapted to edges of aquatic habitats. They primarily feed on fish (taken both alive and as carrion), waterfowl, mammalian carrion, and small birds and mammals. The bald eagle is a wide-ranging raptor found in all 48 states during some point in its life cycle. It is a bird of aquatic ecosystems, frequenting estuaries, large lakes, rivers, reservoirs and some seacoast habitat. Bald eagles currently nest in 47 of 48 contiguous states including New Mexico, and numbers continue to increase from a low of about 500 nesting pairs in the mid-60's to over 6,000 pairs today with some nesting in New Mexico. They are now a very common winter resident in New Mexico. PDM has some potential for negatively impacting the bald eagle. The PDM methods in use by WS of concern are leghold traps and snares, and WS abides the Reasonable and Prudent Methods and Alternatives to avoid jeopardy. WS in New Mexico has not taken a bald eagle incidentally in at least the last 10 FYs.

Piping Plover and Interior Least Tern. The federally listed threatened plover and endangered tern are found primarily during migration in eastern New Mexico. The plover primarily feeds on invertebrates, and the tern feeds on invertebrates and fish. They nest on sandy beaches, especially on islands. They are not negatively impacted by PDM, but can benefit from PDM where predation from species such as raccoons has been identified as a limiting factor for a particular colony. However, WS does not conduct PDM currently for their benefit in New Mexico.

Gould's Wild Turkey. In the Animas and Peloncillo Mountains in Hidalgo County, New Mexico, Gould's subspecies of the wild turkey, a State threatened species, can be found in areas predominated by live-oaks (*Quercus spp.*). They feed on acorns, fruits, wild onions (*Allium spp.*), grass seeds, and insects. The primary threats to this race of wild turkey in the State have been excessive removal of trees and other vegetation, overgrazing, loss or lack of water, poaching, and introduction of non-native turkeys and feral pigs (*Sus scrofa*) into their range (BISON-M 2004). The Gould's turkey could be adversely and positively affected by PDM. PDM methods of concern would be leghold traps and snares. Measures that reduce these risks are use of pan-tension devices and snare stops. The take of predators, especially bobcats, coyotes, and cougars, could benefit the turkey, especially a turkey subpopulation that has been severely reduced. WS has not taken a Gould's wild turkey incidentally in at least the last 11 FYs (since MIS came into existence).

White-tailed Ptarmigan. White-tailed ptarmigan inhabit alpine tundra and timberline habitats, which in New Mexico are mainly above 10,000 feet. The white plumage conceals these birds in winter snow, and their brown-and-white plumage provides protective coloration in other seasons and sites. The degree to which

ptarmigan depend on concealment is legendary, and one can virtually trip over them before they move. White-tailed ptarmigan feed primarily on buds, leaves, flowers, and when available, insects and other arthropods. By the early 1900s, the white-tailed ptarmigan had become extremely rare throughout it's north-central range in New Mexico, and by the mid-1900s it was extirpated from the southern peaks and restricted to only a few peaks in the northernmost reaches of its former range in New Mexico (Ligon 1961). In 1981, NMDGF transplanted ptarmigan from Colorado to unoccupied habitat; in 1993, a nest near the transplant area was found (NMDGF 1996 *cited in* BISON-M 2004). This species presently is resident in the Sangre de Cristo Mountains. The decline in ptarmigan numbers in New Mexico is undoubtedly due to many factors, but particularly overgrazing and increased human use of alpine areas (NMDGF 1996 *cited in* BISON-M 2004). When in low numbers, predation probably plays a role in limiting their abundance. PDM, therefore, could benefit them, especially prior to new ptarmigan reintroductions. WS does not work in these areas, but if WS did, pan-tension devices on traps would be used to preclude capture.

Lesser Prairie-chicken. This Federal candidate species tends to prefer fairly open sandy grasslands and shinnery-oak upland habitat in far eastern New Mexico where it feeds on insects and grains. Decline in this species has primarily been linked to a loss of habitat and potentially other factors (Arritt 1997). Predation keeps the population at lower abundance and WS has conducted some PDM to protect this species. This species can be negatively and positively affected by PDM. The one PDM method that could impact prairie chickens in PDM is the leghold trap; pan-tension devices are used on traps in their areas. PDM, especially coyotes and bobcats, could have a positive benefit for the species, especially where predation has been determined to be a limiting factor to their abundance. WS has not taken a lesser prairie-chicken incidentally in at least the last 10 FYs.

Gila Monster. This State listed endangered species is most widely distributed in desert and mesquite-grassland, but also occurs in pine-oak, tropical deciduous and thorn forests. It is usually found in rocky foothill regions, the lower slopes of mountains and nearby outwash plains, especially where water is at least periodically present. In some areas, they also frequent irrigated farmlands that adjoin those habitat types. Other cover in such areas often includes boulders, rock crevices, downed vegetation, and litter. Gila monsters, though, avoid open flats (BISON-M 2004). Gila monsters dig burrows for shelter, or use those made by other animals or formed by nature. The use of gas cartridges is the only concern in PDM, similar to the ridge-nosed rattlesnake described below. However, most burrows used by gila monsters are from rodents, and Wildlife Specialists are able to determine if a den is being used by the target predator; the gas cartridge can be used for coyotes, red fox, and skunks, but has only been used for coyotes in the last 7 FYs. WS has not taken a Gila monster in at least the last 10 FYs (no MIS records).

New Mexico Ridge-nosed Rattlesnake. This subspecies of ridge-nosed rattlesnake is found locally in Hidalgo County, New Mexico. The population is fairly secure on private lands with its greatest threat from collection by herpetoculturists because of its high value (Holycross 1995). It is found in primarily oak dominated habitat, and some coniferous forest canyon habitat (Baker 1991). It feeds primarily on lizards and other small vertebrates. The only WDM method that could impact this species would be fumigation of predator or rodent burrows. The fumigation of predator burrows is highly unlikely to have an effect on rattlesnakes because coyotes, red fox, and skunks (predators the denning cartridge registration lists as targets) do not tolerate other den inhabitants in active dens. WS personnel, though, received a letter from USFWS that WS is not likely to adversely affect the rattlesnake because WS does not conduct PDM in their habitat. WS has not taken a ridge-nosed rattlesnake in at least the last 10 FYs (no MIS records).

Species Not Listed in New Mexico, but a Potential Concern. Two species are not currently listed as a T&E species in New Mexico, but could be a concern, the Canada lynx and California condor.

Canada Lynx. Canada lynx are medium-sized cats, with long legs, large, well-furred paws, long ear tufts, and a short, black-tipped tail. Adult males average about 30 pounds in weight and females average 19 pounds. The winter pelage of the lynx is dense and has a grizzled appearance with grayish-brown mixed with buff or pale brown fur on the back, and grayish-white or buff-white fur on the belly, legs, and feet. Summer pelage of the lynx is more reddish to gray-brown. The lynx's long legs and large feet make it highly adapted for hunting snowshoe hares (*Lepus americanus*), its primary prey, in deep snow. In the western United States, the distribution of lynx is associated with the southern boreal forests and subalpine coniferous forest; within these general forest types, lynx are most likely to persist in areas that receive deep snow. Colorado was considered the southern extreme of its range, and possibly northern New Mexico, but this was never documented. Canada lynx were recently reintroduced into southwestern Colorado and some of these introduced lynx have been seen in northern New Mexico. Currently, the New Mexico Game and Fish does not list lynx on their endangered species list and are not protected under State law in New Mexico. When the lynx was considered for listing by USFWS (Fed. Register Notice July 8,1998 63:130 pp 36993-37013) it stated that "Colorado represents the extreme southern edge of the range of the Canada lynx." In addition, New Mexico was not considered a state in its listed range nor a state where it was ever documented. The lynx has now been documented in several of the northern Counties, all from the lynx released into Colorado (2 were shot near Chama by landowners protecting their livestock). The majority of radio-collared lynx that have been located in northern New Mexico appear have been in high altitude country (Shenk 2005), probably in characteristic terrain of subalpine forests in mountainous terrain. The Colorado Division of Wildlife is conducting a habitat analysis to determine habitat preference from their locations. PDM could adversely or positively affect the lynx. PDM methods of primary concern are leghold traps, snares, M-44s, and trailing dogs. In New Mexico, WS rarely works in lynx associated habitat and can reduce potential take in areas where they may be by incorporating methods that minimize the chance of take. If a lynx were captured, it could be returned to the Colorado Division of Wildlife for release back into the lynx recovery area. The removal of coyotes and bobcats in or near lynx associated habitat could provide a benefit to lynx by reducing interspecific competition and predation. WS has not taken any lynx in New Mexico.

California Condor. The California condor was extirpated over most of its range by the late 1970s and all wild condors were taken into captivity in 1980s. The propagation program was a success and they were reintroduced back into the wild in California. In addition, a nonessential/experimental population under ESA section 10(j) was been established at the Vermillion Cliffs of northern Arizona. The experimental range included areas in Arizona, Utah, and Nevada. The experimental population of condors has been increasing slowly from introductions and successful nesting; condors reproduce slowly, though, and it may take some time to fully establish their population. Reports indicate that several of these condors have temporarily migrated outside of their experimental population zone including 3 into Colorado, which changes their status to endangered while they are out of the experimental population area. Therefore, it is possible that a condor will disperse temporarily or permanently into New Mexico. The California condor is strictly a scavenger, eating carrion such as cattle, sheep, deer, and ground squirrel carcasses. The condor finds carrion by sight and not smell, unlike a turkey vulture which relies as much, or more, on odor to locate dead animals as it does sight. PDM methods of concern are leghold traps near carcasses (WS Policy

requires a 30 foot distance form a draw station to protect raptors) and M-44s (in 1992 BO (USDA 1997, Appendix F) M-44s must be covered where condors are present). On the other hand, condors have been known to be killed by predators, primarily coyotes. PDM, therefore, could have both negative and positive impacts on them. However, none exist in New Mexico, and in all likelihood, currently only temporary vagrants would be seen in New Mexico.

2.1.2.3 Aircraft Overflights Effects on Wildlife. An issue that has arisen is the potential for low-level flights associated with aerial hunting could potentially disturb wildlife, including T&E species. A number of studies have looked at responses of various wildlife species to aircraft overflights. The National Park Service (1995) reviewed studies on the effects of aircraft overflights on wildlife. The report revealed that a number of studies have documented responses by certain wildlife species that suggest adverse impacts could occur. Few, if any studies, have proven that aircraft overflights cause significant adverse impacts on wildlife populations, although the report stated it is possible to draw the conclusion that impacts to populations are occurring. It appears that some species will frequently or, at least occasionally, show adverse responses to even minor overflight occurrences. In general, it appears that the more serious potential impacts occur when overflights are frequent such as hourly and over long periods of time which represents "chronic exposure." Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. WS aerial hunting operations occur in relatively remote rangeland areas where tree cover is at most scattered to allow for visibility of target animals from the air. In addition, WS spends relatively little time over any one area.

Several examples of wildlife species that have been studied with regard to low-level flights are available in the literature. Colonial waterbirds were reported that low level overflights of 2-3 minutes in duration by a fixed-wing airplane and a helicopter produced no "drastic" disturbance of tree-nesting colonial waterbirds, and, in 90% of the observations, the individual birds either showed no reaction or merely looked up (Kushlan 1979). Conomy et al. (1998) quantified behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) exposed to low-level flying military aircraft in North Carolina and found that only a small percentage (2%) of the birds reacted to the disturbance. They concluded that such disturbance was not adversely affecting the time-activity budgets of the species. Mexican spotted owls (Delaney et al. 1999) did not flush when chain saws and helicopters were greater than 110 yards away and less than particular decibel levels; owls flushed to these disturbances at closer distances and were more prone to flush from chain saws. Owls returned to their predisturbance behavior 10-15 minutes following the event and researchers observed no differences in nest or nestling success (Delaney et al. 1999). USFS (2002) found that Mexican spotted owls showed only minor behavioral changes to F-16 fly-bys during training runs, but less behavioral changes than to natural occurrences. Andersen et al. (1989) conducted low-level helicopter overflights directly at 35 red-tailed hawk (*Buteo jamaicensis*) nests and concluded their observations supported the hypothesis that red-tailed hawks habituate to low level flights during the nesting period; results showed similar nesting success between hawks subjected to such overflights and those that were not. White and Thurow (1985) did not evaluate the effects of aircraft overflights, but found that ferruginous hawks (*B. regalis*) are sensitive to certain types of ground-based human disturbance to the point that reproductive success may be adversely affected. However, military jets that flew low over the study area during training exercises did not appear to bother the hawks, and nor did the hawks get alarmed when the researchers flew within 100 feet in a small fixed-wing aircraft (White and Thurow 1985). White and Sherrod (1973) suggested that disturbance of raptors by aerial surveys with helicopters may be less than that caused by approaching nests on foot. Ellis (1981) reported that five species of hawks, two falcons (*Falco spp.*), and golden eagles (*Aquila chrysaetos*)

were "incredibly tolerant" of overflights by military fighter jets, and observed that, although birds frequently exhibited alarm, negative responses were brief and the overflights never limited productivity.

Krausman et al. (1986) reported that only 3 of 70 observed responses of mule deer to small fixed-wing aircraft overflights at 150 to 500 feet above ground resulted in the deer changing habitats. They believed that the deer may have been accustomed to overflights because the study area was near an interstate highway that was frequently followed by aircraft. VerCauteren and Hygnstrom (2002) noted that when studying the efficacy of hunting to manage deer populations, that when deer were flown over during their censuses, they typically just stood up from their beds, but did not flush. In addition, WS aerial hunting personnel frequently observe deer and antelope standing apparently undisturbed beneath or just off to one side of aircraft. Krausman and Hervert (1983) reported that, in 32 observations of the response of bighorn sheep to low-level flights by small fixed-wing aircraft, 60% resulted in no disturbance, 21% in "slight" disturbance, and 19% in "great" disturbance. Another study (Krausman et al. 1999) found that 14% of bighorn sheep had elevated heart rates that lasted up to 2 minutes after an F-16 flew over at an elevation of 400 feet, but it did alter the behavior of penned bighorns. Weisenberger et al. (1996) found that desert bighorn sheep and mule deer had elevated heart rates for 1 to 3 minutes and changed behavior to alerted for up to 6 minutes following exposure to jet aircraft. Fancy (1982) reported that only 2 of 59 bison (*Bison bison*) groups showed any visible reaction to small fixed-wing aircraft flying at 200-500 feet above ground. These studies indicate that ungulates are relatively tolerant of aircraft overflights, even those that involve noise at high decibels.

WS has actively used fixed-wing aircraft and some helicopters for aerial hunting in areas inhabited by wildlife for years. The fixed-wing aircraft used by WS are relatively quiet whereas the helicopter is somewhat noisier. WS conducts aerial PDM activities on areas only under agreement and concentrates efforts during certain times of the year to specific areas such as lambing grounds. WS (1997a, b, c, 2001a, b, c) looked at the issue of aerial hunting overflights on wildlife and found that WS has annually flown less than 10 min./mi.^{2} on properties under agreement; basically WS flies very little over any one property under agreement in any given year. As a result, no known problems to date have occurred with WS aerial hunting overflights on wildlife nor are they anticipated in the future. Based on the above information and analysis, it is reasonable to conclude that WS aerial hunting low-level flights should not cause any adverse impacts to T&E species, especially considering that aerial hunting is typically conducted over rangelands and little time is spent in any given area daily because the aircraft are constantly moving in search of target species.

2.1.3 Impacts on Public Safety and the Environment

A formal risk assessment of WS PDM methods concluded low risks to humans (USDA 1997, Appendix P) and included those used By WS for PDM in New Mexico such as traps, snares, firearms, aerial hunting, immobilization drugs, and chemical toxicants. The use of chemical drugs and toxicants by WS is regulated by EPA under FIFRA, New Mexico Pesticide Control Laws, and WS Policies and Directives. Under several of the alternatives proposed in this EA, WS would use sodium cyanide in the M-44 device, 1080 compound in the Livestock Protection Collar, and carbon monoxide produced from the gas cartridge used for fumigating coyote, skunk, and fox dens. Based on a thorough Risk Assessment, WS concluded that, when WS chemical methods, including those referenced above, are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible impacts on the environment and do not represent a risk to the public (USDA 1997).

On the other hand, public health and safety may be jeopardized by not having a full array of PDM methods

for responding to complaints involving threats to human health and safety such as direct physical attacks on humans from predators, disease transmission, and airstrike hazards. Predators have been responsible for attacks on humans in New Mexico. An elderly woman was killed by a black bear in her house in north central New Mexico. Coyotes and other large predators represent a significant strike risk at airports and have been struck by aircraft in New Mexico. Finally, disease, especially rabies, can become a threat to humans where an outbreak occurs. Once an animal has this or many other diseases, they are not possible to treat. WS often uses several PDM methods to capture offending animals, depending on the specifics of these types of situation. Firearms, traps, snares, or chemical toxicants may be used to take an offending animal and eliminate further encounters. PDM methods that may pose a slight public safety risk may be used effectively to eliminate a recognized public safety risk. For example, on August 18, 2001, the black bear that killed the woman was tracked and captured the afternoon when her body was found and was no longer a threat to others living nearby.

Additionally, it has been found that people without the utilization of WS will often resort to the unwise or illegal use of methods to resolve predator problems. This has been demonstrated many times and records of arrests involving people trying to protect their resources are replete (discussed in Section 2.2.3).

2.1.4 Effects of PDM, Especially Aerial Hunting Activities, on the Use of Public Lands for Recreation

Some members of the public believe that WS PDM activities conflict with recreation on public lands. Recreational activities include hunting, fishing, wildlife viewing, sightseeing, horseback riding, camping, hiking, fuelwood gathering, skiing, snowmobiling, and boating. In addition, some individuals believe their recreational experiences on public lands are impaired by knowing that any lethal PDM actions are occurring on these lands. Others feel that they are being deprived of the aesthetic experience of viewing or hearing coyotes or other predators because of WS PDM actions. On the other hand, some believe that PDM is wholly acceptable since it can help bolster certain species populations such as T&E species and big game, and eliminate individual predators that are a threat to human health and safety.

A number of different types of Federal lands such as WAs, Wilderness Study Areas (WSAs), and National Conservation Areas occur within the analysis area which currently have special designations and may require special considerations for conducting PDM. These collectively will be referred to as Special Management Areas (SMAs). WS recognizes that some persons interested in SMAs may feel that any PDM activities in these areas adversely affect their aesthetic and natural qualities, value, and the ecosystem. WS abides by the laws, regulations, and policies such as the Wilderness Act as enacted by the U.S. Congress to minimize any effect on the public, but conducts PDM as allowed to reduce damage in the SMAs. Many SMAs have had grazing long before being designated as such and PDM has been conducted on many of these. However, WS conducts PDM on only a few SMA grazing allotments for the protection of livestock. The Current Program Alternative has a minimal effect on BLM, USFS, or other agency SMAs. WS complies with WS guidelines and policies when conducting PDM in these areas. Current laws and regulations allow the public and WS to conduct PDM activities in SMAs under certain limitations. PDM in SMAs is only a very minor component of the current program. Currently, private individuals using firearms and trail hounds can sport hunt or conduct PDM in most SMAs. These activities are not restricted and are allowed by BLM, USFS, or NMDGF regulations. To impose special restrictions on PDM for professional WS personnel involving similar types of methods in SMAs would be arbitrary and inconsistent with legislation.

BLM SMAs. WS PDM in WAs and Wilderness Study Areas (WSAs) would conform with any and all

federal and state laws and regulations that have been determined to apply to WS activities. WS AWPs are reviewed annually by WS and BLM to ensure that areas of conflict with RMPs for SMAs do not exist. Therefore, WS actions should have no effect on wilderness characteristics such as size, naturalness, solitude, aesthetics, primitive or unconfined type of recreation, supplemental values, and the possibility of returning the area to a natural condition as stated in BLM's Wilderness Inventory Handbook from 1978 and the Interim Management Policy of 1995. PDM under the current program has been limited in scope and has not interrupted the wilderness review processes, or impaired the potential suitability for wilderness designation of these areas by Congress. In FY03-FY04, WS did not work on any BLM SMAs with grazing allotments in response to predation of livestock, but potentially could.

USFS SMAs. WS follows policies outlined in the USFS Manual, particularly Section 2323, the National MOU between USFS and WS, and LRMPs when conducting PDM in USFS SMAs. For example, WS does not conduct PDM in USFS specially designated areas except for emergency human health situations. Proposed WS PDM plans are reviewed by USFS during the work planning process to ensure that areas of conflict do not exist. Therefore, WS PDM would have almost no effect on wilderness characteristics or management objectives of SMAs. Proposed PDM would be limited in scope to grazing areas with a limited buffer zone for the protection of livestock, and would not impair the values of the area such as the wilderness designation by Congress. In FY03-FY04, WS did not work on any SMAs on USFS lands, but potentially could.

Other SMAs. USDA (1997) did not specifically address areas such as "Areas of Critical Environmental Concern." or other SMAs where there is a potential to conduct PDM. These areas managed for the protection of certain qualities or values such as biological, riparian, cultural, historic, scenic, geological, paleontological, recreation, rangeland, or sensitive plant species. In general, PDM has not been needed in these types of areas primarily because livestock are often not allowed to graze on them. However, it may be conducted on such areas if the need arises, especially during a human health and safety crisis. Similar to BLM and USFS SMAs, sport hunting and PDM by private individuals using firearms and trail hounds is not always restricted in these areas. The BLM, USFS, or other agency is responsible for identifying any conflicts that PDM might have with the management of any of these types of areas in the work plans that are reviewed annually. If, for example, the respective federal land management agency determines that an area with special management emphasis is to be closed to all public hunting and the use of firearms, or to all low level flights, then WS would be subject to those restrictions unless provided a special exemption. When the need arises, restrictions on methods for these areas may be established in the AWPs. In FY03-FY04, WS did not work on any other SMAs, but potentially could.

2.1.5 Other Issues that Have Been thoroughly Reviewed in Prior EAS

In addition to the above issues, several other issues would have been considered in this EA, but these have been analyzed thoroughly in the previous EAs (WS 1997a, b, c, 2001a, b, c), and their analyses would be almost identical in this EA. Additionally, the environmental consequences of these issues were found to have the least impacts under the Current Program Alternative, the proposed action in the previous EAs and this one. However, some of these issues are still considered in developing SOPs to reduce effects associated with the issue. The following are the issues that were sufficiently discussed and remain about the same and, therefore, will not be rehashed in this EA.

2.1.5.1. Selectivity and Humaneness of PDM Methods. Selectivity of PDM methods is related to the issue

of humaneness in that greater selectivity results in less perceived suffering of nontarget animals. The selectivity of each method is based, in part, on the skill and discretion of the WS Specialist in applying such methods and also on specific measures and modifications designed to reduce or minimize nontarget captures. The humaneness of a given WDM method is based on the human perception of the pain or anxiety caused to the animal by the method. How each method is perceived often differs, depending on the person's familiarity and perception of the issue as discussed in Section 2.2.5. The selectivity and humaneness of each alternative are based on the methods employed and who employs them under the different alternatives.

Schmidt and Brunson (1995) conducted a public attitude survey in which respondents were asked to rate a variety of WDM methods on humaneness (1=not humane, 5= humane) based on their individual perceptions of the methods. Their survey found that the public believes that the nonlethal methods such as animal husbandry, fences, and scare devices were the most humane and traps, snares, and aerial hunting were the least humane. The EAs (WS 1997a, b, c, 2001a, b, c) discussed how selective each of the methods used in New Mexico to take target animals was and information on their humaneness.

In comparison, under the No WS Program Alternative, the federal portion of WS would not employ methods viewed by some persons as inhumane and, thus, have no program effect on humaneness. NMDGF and NMDA would probably still provide some level of professional direct PDM assistance, but without federal supervision, and would continue to use the PDM methods considered inhumane by some individuals, but at lower levels. State WS personnel, though, would no longer receive training from federal sources, nor would the program benefit from federal research focused on improved humaneness, selectivity, and non-lethal methods. However, private individuals that have experienced resource losses, but are no longer provided professional assistance from WS, could conduct lethal PDM on their own. Use of leghold traps, snares, and shooting by private individuals would probably increase. This could result in less experienced persons implementing PDM methods such as traps without modifications like underpan-tension devices that exclude smaller nontarget animals. Greater take or suffering of nontarget and target wildlife would likely be the result. Therefore, it was concluded that the No Federal Program Alternative would result on the highest potential for negative effects (WS 1997a, b, c, 2001a, b, c). Additionally, it is hypothetically possible that frustration caused by the inability of resource owners to reduce losses could lead to the illegal use of chemical toxicants. The illegal use of toxicants could also result in increased animal suffering.

PDM conducted by private individuals would probably be less humane than a federal PDM program partly for other reasons as well. WS is accountable to public input and humane interest groups often focus their attention and opposition on PDM activities employed by WS. PDM methods used by private individuals may be more clandestine. The people that perceive some PDM methods as inhumane would be less aware of PDM activities being conducted by private individuals but mostly because the private individuals would not be required to provide information under any policies or regulations similar to those WS follows. Thus, the perception of inhumane activities could be reduced, although the actual occurrence of PDM activities may increase.

Under the No Federal PDM Alternative, predation rates would be expected to increase. It has been determined that livestock losses are expected to be 4 times higher in areas without effective PDM (USDA 1997). Therefore, more domestic animals, including livestock and pets, would suffer inhumanely from injuries caused by predation than under the current program.

Therefore, the No Federal Program Alternative would likely result in more negative impacts with regard to

humaneness than the current program. The other alternatives analyzed in this EA were also analyzed in the other EAs (WS 1997a, b, c, 2001a, b, c) and found to be between the Current Program and No Federal Program Alternatives. Thus this will not be discussed further, but is used as a factor to help determine appropriate SOPs to maximize selectivity and humaneness.

2.1.5.2. The Potential for PDM to Cause Increases in Rodent, Rabbit, and Other Prey Species Populations to the Point That Detrimental Effects on Vegetation Resources Occur. An issue that often comes up is the fact that PDM will cause increases in rodent, rabbit, and other prey species populations and that these species will have detrimental effects on vegetation resources. This issue was discussed thoroughly in previous EAs (WS 1997a, b, c) and found not to have significant impacts; USDA (1997) did not specifically deal with this issue. In general, it appears that predators prolong the low points in rodent population cycles and spread the duration of the peaks. Predators generally do not "control" rodent populations (Keith 1974, Clark 1972, Wagner and Stoddart 1972). It is more likely that prey abundance controls predator populations, especially a species such as the lynx which exhibits a classic predator-prey relationship with the snowshoe hare. The USFWS (1979, p. 128) concluded that "*WS* Program activities have no adverse impacts to populations of rodents and lagomorphs."

Other prey species of coyotes include white-tailed deer, mule deer, and pronghorn antelope. Based on the information presented in Section 1.3.3.6, it is clear that local short term predator population reductions can enhance deer and antelope populations. This could be either a beneficial or detrimental effect depending upon whether local deer populations were at or below the capacity of the habitat to support them. However, as stated above, since WS only conducts PDM on less than 10% of the land in the analysis area and takes less than 5% of the estimated coyote population in any one year, and cumulatively less than 10%, this take is not enough to deplete the coyote population. The total take of coyotes in New Mexico could be beneficial to deer and antelope to some degree, but mostly in fawning and wintering areas. It is unlikely that positive effects on deer or antelope populations would be significant, except in isolated instances where PDM was intense enough to ensure that a local coyote population covering the breadth of deer and antelope fawning or wintering area was suppressed. If NMDGF, Tribe, or other entity requested coyote removal for the purpose of enhancing antelope or deer herds, an increase in local populations would be desired and considered a beneficial impact on the human environment. In those situations, it is likely that coyote control would be ended when herd management goals were met. In any event, it is unlikely that impacts would be significant in major portions of the analysis area under the current program to cause problems. This issue remained relatively constant under all alternatives.

2.1.5.3 Impact of PDM on Private Recreational and Commercial Fur Harvest. Another issue that was discussed thoroughly in previous EAs (WS 1997a, b, c) was the impact that PDM would have on sportsmen. Game and non-game wildlife populations are not significantly impacted by WS PDM take allowing hunters and trappers ample opportunities for harvest of big game and furbearers. WS PDM is highly directed to target individuals and species in a given area, mostly on private lands, and this can be in low to high density predator areas. WS works on properties mostly until damage is stopped which can take longer than sportsmen would stay in a given area. Additionally, WS only conducts PDM in a small portion of New Mexico (usually less than 10% of the State annually). Sportsmen tend to hunt where furbearer populations are high. When the only monetary benefit is fur value, they cannot make a profit by pursuing individual depredating coyotes in local areas where numbers are low; also, furs are only prime in the winter months and are worthless at the time of year when PDM is most often needed. The typical strategy of private fur takers is to hunt the more easily lured animals in a population and to move on to other areas. Thus, offending

animals may not be taken before the private fur taker moves on, which means depredation losses would often be about as severe as they would without private fur harvest. This issue was found to be about the same under all alternatives.

2.2 ISSUES USED TO DEVELOP WS SOPs FOR PDM

2.2.1 Effects on Target Predator Species Populations

WS annually monitors target predator take in PDM and sport harvest to determine if take has remained within the boundaries set by the EAs (WS 1997a, b, c , 2001a, b, c). Thus far in New Mexico as analyzed in the previous EAs, WS has not exceeded a significant level of take. This EA could easily disregard this issue because WS has consistently shown insignificant impacts to predator populations through analyses. However, predator populations and abundance can change, and, therefore, their populations will be considered. WS SOPs, discussed in Section 3.4, ensure that the take of predators remains below a sustainable harvest, unless the managing agency has different management goals.

2.2.2 Effects on Nontarget Species Populations, Including T&E Species

Special efforts are made to avoid taking nontargets during PDM or jeopardizing T&E species. The selectivity of PDM methods has been improving through the years, and much credit goes to WS's National Wildlife Research Center. Improved padded-jaw traps, pan-tension devices, trap lures, break-away snares, and other tools have helped WS Specialists be more efficient and effective at trapping the target species while minimizing capture of nontarget species. T&E species are avoided by conducting biological evaluations of the potential effects and the establishment of special restrictions or measures to reduce the potential for take, and consultation with USFWS and NMDGF biologists. WS SOPs include measures intended to reduce the effects of PDM on nontarget species populations, especially T&E species, and are presented in Section 3.4.

2.2.3 Impacts on Public Safety and the Environment

WS Specialists have SOPs to reduce potential safety impacts from PDM to the public and the environment. WS relies on its Specialists to use their professional judgment to determine the most effective methods to use in a given predator damage situation, yet have minimal, if any, impact to people and the environment. WS Specialists are professionally trained to use PDM techniques, especially those that could have the potential to impact themselves, the public, and the environment. Several PDM methods have the potential to be hazardous including firearms, pyrotechnics, and predacides. SOPs to reduce potential problems are given in Chapter 3.

On the other hand, one peripheral factor pertinent to assessing the risk of adverse effects of WS PDM activities is the potential for adverse effects from not having professional assistance from programs like WS available to private entities that express needs for such services. WS operates to assist individuals with damage from predators where a need exists. In the absence of a program, or where restrictions prohibit the delivery of an effective program, PDM would be conducted by other entities such as private individuals. Private PDM activities are less likely to be as selective for target species and accountable. Additionally, private activities may include the use of unwise or illegal methods to control predators. For example, in Kentucky a corporation was fined for illegally using carbofuran to destroy unwanted predators including

coyotes and raptors at a private hunting club (Porter 2004). Similarly, on a Georgia quail plantation, predatory birds were being killed by eggs that had been injected with carbofuran (Federal Wildlife Officer 2000); in Oklahoma, Federal agents charged 31 individuals with illegally trapping and killing hawks and owls to protect fighting chickens (USFWS 2003). The Texas Department of Agriculture has a website and brochure devoted solely to preventing pesticide misuse in controlling agricultural pests (Texas Department of Agriculture 2004). Similarly, the Britain Department for Environment, Food and Rural Affairs has a "Campaign against Illegally Poisoning of Animals" (Dacko 2004). Therefore, WS believes that it is in the best interest of the public, pets, nontarget species, and the environment that a professional PDM program be available because private resource owners could elect to conduct their own control rather than use government services and simply out of frustration resort to inadvisable techniques.

2.2.4 Effects of PDM, Especially Aerial Hunting Activities, on the Use of Public Lands for Recreation

Policies and SOPs are in place that help minimize the effects of WS activities on recreation. WS personnel post signs in prominent places to alert the public that PDM tools are set in an area. On private lands, the cooperators or landowners are aware that PDM tools are set and can alert guests using the property of their presence. Landowners determine the areas and timing of equipment placement, thereby avoiding conflicts with recreationists. For public lands, WS coordinates with the different land management agencies to determine high public use areas and for what particular time of the year such as hunting season. High use recreational areas are mostly avoided or the types of equipment used are limited. These areas are designated in AWPs and, as necessary, on maps so PDM does not unnecessarily interfere with recreational activities. WS avoids conducting PDM in high-use recreational areas except for the purposes of human health and safety.

2.2.5 Humaneness of Methods Used by WS

The issue of humaneness and animal welfare as it relates to killing or capturing wildlife is an important and very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns if "*. . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process.*"

Suffering is described as a "*. . . highly unpleasant emotional response usually associated with pain and distress.*" However, suffering "*. . . can occur without pain . . .*" and "*. . . pain can occur without suffering . . .*" (American Veterinary Medical Association 1987). Because suffering carries with it the implication of a time frame, a case could be made for "*. . . little or no suffering where death comes immediately . . .*" (California Department of Fish and Game 1991), such as shooting.

Defining pain as a component of humaneness and animal welfare in BDM methods used by TWSP appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would "*. . . probably be causes for pain in other animals . . .*" (American Veterinary Medical Association 1987). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (California Department of Fish and Game 1991).

Pain and suffering, as it relates to damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining

suffering since ". . . *neither medical nor veterinary curricula explicitly address suffering or its relief*" (California Department of Fish and Game 1991). Research suggests that some methods, such as restraint in leghold traps or changes in the blood chemistry of trapped animals, indicate "*stress*" (USDA 1997). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness.

The American Veterinary Medical Association states "... *euthanasia is the act of inducing humane death in an animal*" and "... *the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness.*" (Beaver et al. 2001). Some people would prefer American Veterinary Medical Association accepted methods of euthanasia to be used when killing all animals, including wild and feral animals. This states that "*For wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible. In field circumstances, wildlife biologists generally do not use the term euthanasia, but use terms such as killing, collecting or harvesting, recognizing that a distress-free death may not be possible.*" (Beaver et al. 2001).

Some individuals and groups are opposed to some management actions of WS. WS personnel are experienced and professional in their use of management methods. This experience and professionalism allows WS personnel to use equipment and techniques that are as humane as possible within the constraints of current technology. Professional PDM activities are often more humane than nature itself (ie. death from starvation) because these activities can produce quicker deaths that cause less suffering. Research suggests that with some methods, such as restraint in leghold traps, changes in the blood chemistry of trapped animals indicate "stress." Blood measurements indicated similar changes in foxes that had been chased by dogs for about five minutes as those restrained in traps (USDA 1997). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness. People concerned with animal welfare often express that they would like to see animal suffering minimized as much as possible and that unnecessary suffering be eliminated. The interpretation of what is unnecessary suffering is the point to debate (Schmidt 1989).

Humaneness, as perceived by the livestock industry and pet owners, requires that domestic animals be protected from predators because humans have bred many of the natural defense capabilities out of domestic animals. It has been argued that man has a moral obligation to protect these animals from predators (USDA 1997). Predators frequently do not kill larger prey animals quickly, and will often begin feeding on them while they are still alive and conscious (Wade and Bowns 1982). The suffering apparently endured by livestock damaged in this manner is unacceptable to many people.

Thus, the decision-making process involves tradeoffs between the above aspects of pain and humaneness. Objective SOPs to minimize impacts from this issue must consider not only the welfare of wild animals, but also the welfare of humans if damage management methods were not used. Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal. People may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

WS has improved the selectivity of management devices through research and development of pan-tension devices, break-away snares, and chemical immobilization/euthanasia procedures that minimize pain. Research continues to improve selectivity, practicality, and humaneness of management devices (USDA 1997). Until such time as new findings and products are found to be practical, a certain amount of animal

suffering will occur if PDM objectives are to be met in those situations where nonlethal PDM methods are ineffective or impractical. Furthermore, if it were possible to quantify suffering, it is possible that the actual net amount of animal suffering would be less under the proposed action (or any other alternative involving the use of lethal methods) than under the No Federal WS PDM Alternative since suffering experienced by livestock preyed upon by predators is reduced if PDM is successful in abating predation. SOPs used to maximize humaneness are listed in Chapter 3.

2.2.6 Effectiveness of WS

WS's effectiveness can be evaluated in many ways, but some SOPs are in place to maximize effectiveness while considering all of the other issues. The overall effectiveness is often difficult to ascertain. The effectiveness of the program can be defined in terms of economic losses reduced for agriculture and property, the decreased number of incidences of public health and safety, and the natural resources protected. Effectiveness also includes costs of the program to the individual resource owners, the public, states, and other jurisdictions, and direct and indirect impacts, including costs of impacts on the environment. The Current Program Alternative was compared with the other alternatives in USDA (1997) and it was concluded to be the most effective of the alternatives considered.

The effectiveness of WS can also be measured by public satisfaction with the PDM program. In a survey that Policy and Program Development of APHIS conducted, it was determined that the satisfaction of the people assisted with wildlife damage management by the WS program nationwide was very high (APHIS 1994). Another measure of effectiveness could be the cumulative impacts of WS's PDM activities on wildlife species and the environment. The U.S. Government Accounting Office (1990) analyzed the WS Program's western States effects on predators and determined that the WS Program does not have an overall effect on predators. However, WS is reviewing the possibility of such an effect in this EA. Finally, a measure of success can be determined by a cost-benefit analysis of a PDM project or program. CEQ regulations (40 CFR 1502.23) do not require a formal cost-benefit analysis to be in compliance with NEPA regulations. Since a major intent of WS is to be cost-effective within the confines of other SOPs, WS employees weigh the relative benefits with the cost of different PDM tools to determine the most productive potential solution.

2.3 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

Several other issues were addressed in the previous EAs (WS 1997a, b, c, 2001a, b, c) that did not receive detailed analysis with rationale. The analysis for these issues were complete and no new information has arisen that would change the analysis already given and their inclusion in the issues considered in the comparison of alternatives. Therefore, the analyses for the following issues can be found in the previous EAs and will not be repeated here.

- WS's impact on biodiversity.
- Livestock losses should be an accepted cost of doing business (a threshold should be reached before providing PDM service).
- No PDM at taxpayer's expense (PDM should be fee based).

- The indiscriminate killing of coyotes often disturbs stable coyote populations, thus encouraging opportunist animals far more likely to kill livestock.
- The objectives set by WS for PDM are unreasonable.
- The appropriateness of manipulating wildlife for the benefit of hunters or recreation.
- Appropriateness of using rancher-supplied data to quantify livestock losses.
- Appropriateness of preparing an EA (instead of an EIS) for such a large area.
- WS's removal of coyotes exacerbates the livestock depredation problem because the coyote population reduction results in greater reproduction.
- PDM in Wilderness Areas.

Additional issues have arisen since the last EAs were written and are given next with justification given for not considering them in detail.

2.3.1 Concerns that the Proposed Action May Be "Highly Controversial" and Its Effects May Be "Highly Uncertain," Both of Which Would Require That an EIS Be Prepared

The failure of any particular special interest group to agree with every act of a Federal agency does not create a controversy, and NEPA does not require the courts to resolve disagreements among various scientists as to the methodology used by an agency to carry out its mission (Marsh v. Oregon Natural Resource Council, 490 U.S. 360, 378 (1989)). As was noted in the 1996 FONSI: "The effects on the quality of the human environment are not highly controversial. Although there is some opposition to PDM, this action is not highly controversial in terms of size, nature, or effect." If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared.

2.3.2 Impacts of Predator Removal on the Public's Aesthetic Enjoyment of Predators

Wildlife is generally regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Some members of the public have expressed concerns that PDM could result in the loss of aesthetic benefits to the public, resource owners, or local residents. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

WS PDM activities occur on a relatively limited portion of the total area in New Mexico, and the portion of various predator species' populations removed through WS predator damage management activities is typically low (see Chapter 4). In localized areas where WS removes some portion of the predator population, dispersal of predators from adjacent areas typically contributes to repopulation of the area within a few weeks to a year, depending on the level of predator removal and predator population levels in nearby areas. Most of the species potentially affected by WS PDM activities are relatively abundant, but are not commonly observed because of their secretive and largely nocturnal behavior. The likelihood of getting to see or hear

a predator in some localized areas could be temporarily reduced as a result of WS PDM activities, but because there is already a low likelihood of seeing a predator, this temporary local reduction in public viewing opportunity would not likely be noticeable in most cases. Impacts on overall populations would be relatively low under any of the alternatives being considered in this EA, and opportunities to view, hear, or see evidence of predators would still be available. The potential minor reduction in local opportunity to view predators must be weighed against the potential economic harm suffered by livestock owners or others affected by predator damage, if PDM were not implemented.

2.3.3 Potential Effects on Wildlife from the Mere Presence of WS Personnel Conducting PDM

Some members of the public have expressed concerns that the mere presence of WS personnel in the field during the spring months has the potential to cause harmful disturbance to wildlife, and could potentially cause some animals to be separated from their mothers or might cause the abandonment of nest sites. Professional wildlife biologists with NMDGF believe there is no basis for this speculation, especially considering the short duration WS personnel spend in any particular area (B. Dunn, NMDGF, pers. comm., 2003).

2.3.4 Concerns that the Killing of Wildlife Represents "Irreparable Harm"

Some members of the public have suggested that the killing of any wildlife represents irreparable harm. Although an individual predator or multiple predators in a specific area may be killed by WS in PDM activities, this does not in any way irreparably harm the continued existence of these species. New Mexico's historic and current populations of big game animals, game birds, furbearers and unprotected predators, which annually sustain harvests of thousands of animals, are obvious testimony to the fact that the killing of wildlife does not cause irreparable harm. Populations of some of these species are in fact much higher today than they were several decades ago (e.g., elk and cougars), in spite of liberal hunting seasons and the killing of hundreds or thousands of these animals annually. The legislated mission of NMDGF is to preserve, protect, and perpetuate all the wildlife of the State. NMDGF would never allow any activity that would cause irreparable harm to the wildlife resources of the State.

2.3.5 Concerns that WS Employees Might Unknowingly Trespass

WS is well aware that it is sometimes difficult to determine land ownership in some areas, and WS field employees make diligent efforts to ensure that they do not enter properties where they do not have permission. Landowners who request assistance from WS typically provide WS representatives with very specific information not only about the property boundaries of their own land, but about the boundaries of neighboring lands as well. WS aerial hunting activities are typically conducted with the aerial crew in radio contact with a WS representative on the ground who knows the property boundaries of the area being worked.

2.3.6 Livestock Losses Are a Tax "Write Off"

Some people believe that livestock producers receive double benefits because producers have a partially tax funded program to resolve predation problems while they also receive deductions for livestock lost as a business expense on tax returns. However, this notion is incorrect because the Internal Revenue Service tax code (Internal Revenue Code, Section 1245, 1281) does not allow for livestock losses to be "written off" if

the killed livestock was produced on the ranch. About 77% of predation occurs to young livestock (lambs, kids, and calves) in New Mexico. Additionally, many ewes, nannies, and cows added as breeding stock replacements to herds from the lamb, kid, and calf crop, and if lost to predation they cannot be "written off" since they were not purchased. These factors limit the ability of livestock producers to recover financial losses. This analysis clearly shows that producers do not receive double benefits from having a federal program to manage wildlife damage and collect federal tax deductions for predation losses.

2.3.7 American Indian and Cultural Resource Concerns

The National Historic Preservation Act of 1966, as amended, requires federal agencies to evaluate the effects of any federal undertaking on cultural resources and determine whether they have concerns for cultural properties in areas of these federal undertakings. In most cases, wildlife damage management activities have little potential to cause adverse affects to sensitive historical and cultural resources. In consideration of cultural and archeological interests, though, WS solicited input from the New Mexico State Historic Preservation Office. Their response to WS was that wildlife damage management activities would have negligible impacts, if any, to historic properties in New Mexico.

The Native American Graves and Repatriation Act of 1990 provides protection of American Indian burials and establishes procedures for notifying Tribes of any new discoveries. Senate Bill 61, signed in 1992, sets similar requirements for burial protection and Tribal notification with respect to American Indian burials discovered on state and private lands. If a burial site is located by a WS employee, the appropriate Tribe or official will be notified. PDM activities would be conducted at the request of a Tribe or their lessee, and, therefore, the Tribe would have ample opportunity to discuss cultural and archeological concerns with WS. However, in consideration of New Mexico's Native Americans, WS has included all of the recognized Tribes in New Mexico on the mailing list for this EA to solicit their comments.

2.3.8 Impacts on the Natural Environment Not Considered

WS's PDM activities have been evaluated for their impacts on several other natural environmental factors. USDA (1997) concluded that impacts on air quality from the methods used by WS are considered negligible. In addition, the proposed action does not include construction or discharge of pollutants into waterways and, therefore, would not impact water quality or require compliance with related regulations or Executive Orders. The proposed action would cause only very minimal ground disturbance and, therefore, impact soils and vegetation insignificantly.

2.4 ISSUES NOT CONSIDERED BECAUSE OUTSIDE THE SCOPE OF THIS ANALYSIS

WS often receives public comments on issues and alternatives that are outside of the scope of the analysis for the EA and cannot impact these in a wildlife damage management program. Several of these are included here.

- How the WS program is funded.
- The Act of March 2, 1931 should be repealed.
- WS exacerbates coyote damage problems by killing off rodents and rabbits so they do not have

adequate supplies of natural prey.

- Appropriateness of livestock grazing on public lands.
- Appropriateness of fees for public lands grazing.
- Riparian damage caused by livestock grazing.
- WS services should not be provided to property owners who restrict public access to their lands.
- Impacts of grazing, fires, and noxious weeds on wildlife habitat.
- Wolf reintroduction throughout the State.
- WS has no formal appeals process.
- Road closures to the public restrict access to private trappers.
- Habitat management should be studied as a way to increase wildlife populations.
- Human overpopulation.
- Impacts of non-WS related disturbances such as development of water sources, livestock grazing and herding, agricultural activities, hiking, fishing, horseback riding, and sightseeing activities.
- Reduction or elimination of wildlife hunting seasons should be considered as an alternative to reducing predator populations for protection of wildlife.

CHAPTER 3: ALTERNATIVES

WS's alternatives must encompass the varied and diverse needs of wildlife damage management and be applicable throughout the program in New Mexico. The varied nature and species diversity inherent in the different requests for assistance to manage damages caused by mammalian predators requires WS to be diverse, dynamic and flexible. The program, under any selected alternative, must be adaptable to varied situations that can be accomplished in a timely manner.

USDA (1997) developed 13 possible alternatives. Of the 13 courses of action, five alternatives were determined to be relevant to the New Mexico WS Program by WS, cooperating agencies, and the public and were considered in the 3 EAs (WS 1997a, b, c). In summary, the five alternatives from these EAs were: 1) Continue the current Federal PDM program, the Proposed Action; 2) No Federal PDM program; 3) Technical Assistance only; 4) Nonlethal required before lethal control; and 5) Corrective control only when lethal PDM methods are used.

3.1 ALTERNATIVES ANALYZED IN DETAIL

3.1.1 Alternative 1 - Current Program, the "Proposed Alternative"

This is the "No Action" Alternative as defined by CEQ for ongoing Programs. This alternative would allow the current program to continue as conducted under the three different EAs in New Mexico (WS 1997a, b, c, 2001a, b, c), though this one EA would replace the three. WS would continue to provide PDM statewide within the scope of the analysis herein.

3.1.2 Alternative 2 - No Federal WS PDM

This alternative consists of no Federal PDM assistance in New Mexico.

3.1.3 Alternative 3 - Technical Assistance Only

Under this alternative, WS would only provide advice or guidance on PDM techniques and methods, but would not conduct any direct operational PDM in attempting to assist in resolving damage complaints.

3.1.4 Alternative 4 - Nonlethal Required before Lethal Control

This alternative would require that resource owners use nonlethal techniques prior to WS implementing lethal PDM methods top resolve a damage problem.

3.1.5 Alternative 5 - Corrective Control Only When Lethal PDM Methods are Used

This alternative would require that livestock depredation or other resource damage by predators must have occurred before the initiation of lethal control. No preventive lethal PDM would be allowed.

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 Alternative 1 - Continue the Current Federal PDM Program

The "No Action" Alternative is a procedural NEPA requirement (40 CFR 1502.14(d)), and is a viable and reasonable alternative that could be selected. It serves as a baseline for comparison with the other alternatives and, as a result, discussed in the most depth. In this EA, the "No Action" Alternative is consistent with CEQ's definition and is equivalent to the current program as conducted under the three WS District EAs (WS 1997a, b, c) that are being combined into a statewide EA here. This EA reflects the descriptions, restrictions, and the SOPs found within the 3 separate WS District EAs, including their accompanying FONSIs and RODs (WS 1997a, b, c) and new FONSIs/RODs (WS 2001a, b, c). The issues, alternatives, and SOPs from these EAs have been reviewed, examined, and incorporated, as appropriate, into this EA. The 3 EAs represented 3 separate analyses for possible environmental impacts of the District WS Programs. All resulted in nearly identical determinations of no significant impact. As a result of no significant impact at the District levels, to keep WS PDM consistent at the statewide level, and because monitoring effects on wildlife populations is best at the statewide level (matches NMDGF data), WS has determined that one EA would adequately address issues and concerns in a comprehensive document for New Mexico.

Under the current program, the majority of the requests for PDM, over 75%, come from livestock operators associated with both private and public lands. WS also receives requests for PDM assistance to protect other agricultural products such as crops, property and natural resources, and human health and safety. Most of these requests come from private individuals. Some requests come from public entities such as a County Sheriff, the Health Department, and wildlife management agencies. Livestock and other resource owners are given PDM assistance from WS within the fiscal constraints of the program. The current PDM program on private lands is governed by WS policy and a specific private property agreement for that particular property, which specifies the methods to be used and the species to be targeted. While the majority of livestock owners are based on private land, many of them graze their livestock on or adjacent to public lands for some portion of the year and can encounter depredation from predators that originate from the public lands. PDM provided by WS personnel can be conducted on public, private, state, Tribal, and other lands, or any combination of these land class types.

The current program activities on federal and public lands (BLM and USFS) are defined specifically in AWPs and WS follows all laws and regulations that have been determined to apply to PDM on these lands for WS. The amount of the different land classes, specifically BLM and USFS, in each WS District are different with the percentage of BLM highest in the Las Cruces District and USFS lands in the Albuquerque District. WS provides information on proposed PDM activities to the cooperating agencies (BLM, USFS, NMDGF); these agencies are responsible for reviewing the proposed actions to assess their compatibility with established RMPs or LRMPs. It is the land management's responsibility to clearly show where a proposed action would likely conflict with land use plans. Maps are used to delineate areas where PDM restrictions or limitations are needed to avoid conflicts with land uses. The AWP and WS Decision Model (Slate et al. 1992) provide further site specific planning mechanisms to evaluate and monitor the PDM activities for a given area.

3.2.1.1 Planned Control Areas. Planned control areas are areas where WS is actively working or plans to work to limit predator damage. Planned activities are those which are anticipated to occur based on historical needs. However, PDM may or may not be conducted in these areas because needs vary from year to year and site to site because WS cannot actually predict where losses are going to occur. PDM is most concentrated in areas where livestock are most abundant and during times when they are most vulnerable to predators (e.g., during calving and lambing). Requests for assistance in reducing property damage and

threats to human health and safety are by their nature, intermittent and, thus, far less predictable.

Summary of Major Planned Seasonal Activities and PDM Methods Used for the WS Districts. WS is divided into three management Districts - Albuquerque, Las Cruces, and Roswell (Figure 1). The major planned activities and brief descriptions of the District programs are summarized below. The primary PDM activity in every District has been coyote damage management for the protection of, primarily, sheep and calves. In FY04, coyotes were by far the predominate predator involved in PDM activities. Of other notable interest in PDM from the public is the take of large predators. In FY04, no black bears were taken, but they have been in taken the past in all Districts and damage was documented in every District from them in FY04. Cougars were in all Districts in relatively low numbers, but highest in the Roswell District. PDM is periodically conducted in designated WAs or WSAs when allowed by the legislation designating the area or under other regulations that are applicable to WS. In FY04, WS did not work in any WAs or WSAs.

Albuquerque District. The majority of requests for WDM (no reports are available in the MIS to delineate lands worked for predators versus other species such as beavers (*Castor canadensis*) and, therefore, all damage management activities involving all wildlife are included in these figures) in the Albuquerque District occur on private land. The District conducted WDM in FY04 on agreements or work plans that had 79% private, 9% USFS, 9% State, 2% BLM, and less than 0.1% other lands, but not all of this land had PDM nor WDM conducted on it, especially State lands. The primary resources protected from predators from requests taken in FY04 were livestock (calves, sheep, poultry, and some goats and horses) and some property. Human health and safety requests were fairly high in FY04 from a variety of species and concentrated in urban areas, especially in Albuquerque and Santa Fe. The USFS allotments where PDM could be conducted by WS were on the Cibola National Forest; allotments on the Carson and Santa Fe National Forests have also been historically worked. These are mostly grazed, if they are grazed, during late spring and summer months with most livestock wintering on private grounds and a few allotments primarily in the Albuquerque BLM District and minimally in the Farmington District. State Trust lands are intermingled in private grounds throughout the District and are denoted on agreements. The primary targets of PDM activities were coyotes, striped skunks, bobcats, and cougars to protect livestock and poultry. In FY04, coyotes were 98% and skunks 1% of the total target take of predators in the District. The primary methods used to take target coyotes were aircraft, M-44s, neck snares, and calling. Skunks were primarily targeted with cage traps. Of the large predators (cougars and black bears), 2 cougars were taken in the District in FY04; a cougar was shot and another was taken in a foot snare.

Las Cruces District. The majority of requests for WDM operations in the Las Cruces District occur on private and BLM lands. The District conducted WDM in FY04 under agreements or work plans on 41% private, 35% BLM, 16% State, 8% USFS, and less than 0.1% other lands. The primary resources protected from predators in the District from requests taken in FY04 were livestock (calves and some sheep, poultry and goats), and property, with some natural resource requests. Requests to protect human health and safety were relatively few in FY04, but from a variety of predators. The USFS allotments where PDM was conducted by WS in FY04 are on the Gila, Lincoln, and Cibola National Forests, and potentially on the Coronado National Forest (WS has not conducted PDM on this Forest for many years, but potentially could); these are mostly grazed during late spring and summer months with most livestock wintering on private grounds and allotments in the Las Cruces BLM District. State lands are intermingled throughout the District. The primary targets of PDM activities were coyotes, bobcats, cougars, and striped skunks to protect livestock. In FY04, coyotes were 99% and bobcats, cougars, and skunks 1% of the total target take of predators in the District. The primary methods used to take target coyotes were aircraft, calling, leghold

traps, and M-44s. Bobcats were primarily targeted with leghold traps. Of the large predators (cougars and black bears), 6 cougars were taken in the District in FY04; 3 cougars were taken in foot snares, 2 with dogs, and 1 with a neck snare.

Roswell District. The majority of requests for WDM operations in the Roswell District occur on private land. The District conducted WDM in FY04 under agreements or work plans on 66% private, 23% BLM, 10% State, 1% USFS, and less than 0.1% other lands. The primary resources protected from predators from requests taken in FY04 were livestock (sheep, calves, sheep, poultry, and some goats and horses), property, and some natural resources. Human health and safety requests in the District were relatively minor and were all as a result of skunks in FY04. The USFS allotments where PDM has been conducted by WS are on Cibola and Lincoln National Forests; these are mostly grazed during late spring and summer months with most livestock wintering on private grounds and a few allotments in the Roswell BLM Districts. State Trust lands are intermingled in private grounds throughout the District. The primary targets of PDM activities were coyotes, bobcats, striped skunks, cougars, and gray fox to protect livestock. In FY04, coyotes were 94%, bobcats 5%, and skunks, cougars and gray fox 1% of the total target take of predators in the District. The primary methods used to take target coyotes were aircraft, leghold traps, M-44s, neck snares, shooting, and calling. Additionally, 3 coyotes were taken with the LPC collar, the only District where coyotes were taken with this method. Bobcats were primarily targeted with leghold traps. Striped skunks were targeted with cage traps. Ten cougars were taken in the District in FY04; 8 were taken with neck snares, one with a leghold trap and one was shot.

Unplanned/Emergency Control Areas. Unplanned and emergency PDM may be provided in areas where no PDM is scheduled with the exception of areas designated as restricted for safety or other reasons. The restricted zones are identified by WS, cooperators, or cooperating agencies; these areas, if not well known (i.e., a well known area may not need to be described such as *Boy Scout Camp X*), are often noted on maps using a color scheme in AWPs. Where unanticipated local damage problems arise that threaten human health and safety or property, WS may take immediate action to eliminate or curtail the problem upon receipt of a request for assistance provided the proposed PDM is not located within a designated restricted activity zone. Emergency PDM activities are handled on a case-by-case basis, as the need arises. WS notifies the cooperating agency as soon as practicable after the emergency action commences and the work is performed.

3.2.1.2 Integrated Wildlife Damage Management. WS has been conducting WDM in the United States for more than 85 years, and has changed WDM activities to reflect societal values and minimize impacts to people, wildlife, and the environment. The efforts have involved research and development of new methods and the implementation of effective strategies to resolve wildlife damage. The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. IWDM is the implementation and application of safe and practical methods for the prevention and control of damage caused by wildlife based on local problem analyses and the informed judgement of trained personnel; this application of PDM by WS Specialists (WS Directive 2.105) is to reduce damage through the WS Decision Model (Slate et. al. 1992) described in USDA (1997) and Section 1.5.5.

The philosophy behind IWDM is to implement effective management techniques in a cost effective manner while minimizing the potentially harmful effects on humans, target and nontarget species, and the environment. IWDM draws from the largest possible array of options to create a combination of techniques appropriate for the specific circumstances. IWDM may incorporate cultural practices (i.e. animal husbandry), habitat alteration, animal behavior modification (i.e. scaring), local population reduction, or any

combination of these, depending on the characteristics of the specific damage problems. USDA (1997) describes the procedures used by WS personnel to determine management strategies or methods applied to specific damage problems. As depicted in the Decision Model (Figure 3), consideration is given to the following factors before selecting or recommending PDM methods and techniques:

- Species responsible for damage
- Magnitude, geographic extent, frequency, and duration of the problem
- Status of target and nontarget species, including T&E species
- Local environmental conditions
- Potential biological, physical, economic, and social impacts
- Potential legal restrictions
- Costs of control options
- Prevention of future damage (lethal and nonlethal techniques)

WS personnel provide information, demonstrations, and advice on available PDM techniques. Technical assistance includes demonstrations on the proper use of some management devices and information on animal husbandry, wildlife habits, habitat management and animal behavior modification. Technical assistance is generally provided following an on-site visit or verbal consultation with the requestor. Generally, several management strategies are described to the requestor for short and long-term solutions to damage problems; these strategies are based on the level of risk, need and practical application. Technical Assistance recommendations do not constitute a federal action other than giving people advice on methods that could be used to resolve a problem.

Operational damage management assistance is implemented when the problem cannot be resolved through technical assistance. The initial investigation defines the nature and history of the problem, extent of damage, and the species responsible for the damage. Professional skills of WS personnel are often required to resolve problems effectively, especially if restricted pesticides are proposed or if the problem is complex, requiring the direct supervision of a wildlife professional. WS considers the biology and behavior of the damaging species and other factors using the WS Decision Model (Slate et al. 1992). The recommended strategy(ies) may include any combination of preventive and corrective actions that could be implemented by the requester, WS, or other agency personnel, as appropriate. These strategies are preventive or corrective in character.

Preventive Damage Management is applying PDM strategies before damage occurs, based on historical problems and data. Most nonlethal methodologies, whether applied by WS or resource owners, are employed to prevent damage from occurring and, therefore, fall under this category of PDM methods. For example, fencing is often used to keep wildlife such as predators out of livestock pastures and prevent damage from occurring. Unfortunately, many nonlethal PDM techniques are only effective for a short time before wildlife habituate to them (Pfeifer and Goos 1982, Conover 1982) and are generally only practical for small areas (Arhart 1972, Rossbach 1975, Shirota et al. 1983, Schmidt and Johnson 1984, Mott 1985, Dolbeer et al. 1986, Graves and Andelt 1987, Tobin et al. 1988, Bomford 1990). When requested, WS personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. For example, in areas where substantial lamb or calf depredations have occurred on lambing or calving grounds in the past, WS may provide information about livestock guarding animals, fencing or other husbandry techniques, or if requested and appropriate, conduct PDM before lambing or calving begins. The rationale for conducting preventive damage management to reduce damage differs little in principle from holding

controlled hunts for deer or elk in areas where agricultural damage has been a historical problem. By reducing the number of deer near agricultural fields, or the number of coyotes near a herd of sheep, the likelihood of damage is reduced.

Corrective Damage Management is applying PDM to stop or reduce current losses. As requested and appropriate, WS personnel in New Mexico provide information and conduct demonstrations, or take action to prevent additional losses. For example, in areas where verified and documented lamb depredations are occurring, WS may provide information about livestock guarding animals, fencing or husbandry techniques, or conduct operational damage management to stop the losses. The U.S. General Accounting Office (1990) concluded that, according to available research, localized lethal damage management is effective in reducing predator damage.

Methods Available for Use

A wide range of methods are used by WS personnel in PDM and strategies are based on applied IWDM principles. WS employs or recommends three general strategies to reduce wildlife damage: resource management, physical exclusion, or wildlife management. Each of these approaches represents a general strategy or recommendation for addressing wildlife damage situations. Within each approach, specific methods or tactics are available for PDM, including many that are specific to individual species. WS conducts operational PDM involving take on private lands only where signed *Agreements For Control On Private Property* have been executed. WS conducts operational PDM on municipal, county or other government lands only after *Agreements For Control On Nonprivate Property* or Work Plans are in place covering the government land. These agreements and work plans list the intended target animals and the methods to be used.

Requests for WS assistance from the public or other agencies may be handled through technical assistance or operational damage management. WS uses or recommends several PDM methods in technical assistance and operational damage management projects that may involve resource management, physical exclusion, and wildlife management techniques. Technical assistance may include providing advice, information, recommendations, and materials to others for use in resolving wildlife-caused damage especially with resource management and physical exclusion methods, and potentially a few wildlife management techniques such as harassment and cage traps. WS operational damage management efforts can include any of the PDM methods, but primarily involve site-specific "hands-on" wildlife management techniques that are difficult for much of the public to implement or involve safety concerns when being implemented by the public.

WS in New Mexico uses or recommends a wide variety of the methods for PDM. A few techniques often suggested by other entities or individuals for use by resource owners to stop a predator damage problem may not be considered by WS if they are biologically unsound, legally questionable, or ineffective. Following is a basic list of methods considered by WS for PDM and a discussion of their use.

Resource Management
- Habitat Management
- Guard Animals
- Animal Husbandry Techniques
- Modification of Human Behavior

Physical Exclusion

- Fencing
- Netting

Wildlife Management
- Frightening Devices
- Capture Methods (lethal and nonlethal)
- Chemical Repellents
- Immobilization/Euthanasia
- Chemical Medications
- Chemical Toxicants

Detailed Description of Methods Used by New Mexico WS in PDM

Following is a description of the methods used in PDM.

Resource Management

Resource management includes a variety of practices that may be used by agriculture producers and other resource owners to reduce their exposure to potential predator depredation losses. Implementation of these practices is appropriate when the potential for depredation can be reduced without significantly increasing the cost of production or diminishing the resource owner's ability to achieve land management and production goals. Changes in resource management are usually not conducted operationally by WS, but WS could assist producers in implementing changes to reduce problems. WS has the potential for using the following techniques in PDM.

Habitat Management. Localized habitat management is often an integral part of PDM. The type, quality, and quantity of habitat are directly related to the wildlife produced or attracted to an area. Habitat can be managed to not produce or attract certain wildlife species. Habitat management is typically aimed at eliminating cover used by particular predators at specific sites. Limitations of habitat management as a method of reducing predator damage are determined by the characteristics of the species involved, the nature of the damage, economic feasibility, and other factors. Legal constraints may also exist which preclude altering particular habitats. Most habitat management recommended by WS in PDM is aimed at reducing wildlife aircraft strike hazards at airports (i.e., managing brush and grass cover at airports to reduce field rodent populations which are a prey-base attractant) or reducing cover for predators near lambing or calving pens and grounds to reduce predation. The last is particularly important in PDM because predators are more likely to be successful if the area is conducive to ambush or allows the predator to approach the prey species under the cover of dense brush. Removal or thinning of the brush can discourage predator activity. Also, opening the area allows for better monitoring and increases the value of shooting. WS provides recommendations at airports to modify the habitat, but generally does not engage in habitat management directly. WS does not modify habitats nor generally recommend any sort of habitat modifications in T&E species habitat.

Animal Husbandry Techniques. This general category includes modifications in the level of care and attention given to livestock, shifts in the timing of breeding and births, selection of less vulnerable livestock species to be produced, and the introduction of human custodians (herders) to protect livestock. The level of care or attention given to livestock may range from daily to seasonal. Generally, as the frequency and intensity of livestock handling increase, so the degree of protection also increases. In operations where

livestock are left unattended for extended periods, the risk of depredation is greatest. The risk of depredation can be reduced when operations permit nightly gathering so livestock are unavailable during the hours when predators are most active. Additionally, the risk of depredation is usually greatest with immature livestock. This risk diminishes as age and size increase and can be minimized by holding expectant females in pens or sheds to protect births and by holding newborn livestock in pens for the first 2 weeks. Shifts in breeding schedules can also reduce the risk of depredation by altering the timing of births to coincide with the greatest availability of natural prey to predators or to avoid seasonal concentrations of migrating predators such as golden eagles. The use of herders can also provide some protection from predators, especially for bands of sheep on open range where predation can be quite high.

Altering animal husbandry to reduce wildlife damage has many limitations. Nightly gathering may not be possible where livestock are in many fenced pastures and where grazing conditions require livestock to scatter. Hiring extra herders, building secure holding pens, and adjusting the timing of births is usually expensive. The timing of births may be related to weather or seasonal marketing of young livestock. The expense associated with a change in husbandry practice may exceed the savings.

Guard Animals. Guard animals are used in PDM to protect a variety of resources, primarily livestock, and can provide protection at times. Guard animals (i.e., dogs, burros, and llamas) have proven successful in many sheep and goat operations. The effectiveness of guarding animals may not be sufficient in areas where there is a high density of wildlife to be deterred, where the resource, such as sheep foraging on open range, is widely scattered, or where the guard animal to resource ratios are less than recommended. In addition, some guard animals intended for protection against small to medium size predators like coyotes may be prey to larger predators like cougars and black bears. New Mexico WS often recommends the use of guard dogs, but does not have an operational guard dog program.

Modification of Human Behavior. WS often tries to alter human behavior to resolve potential conflicts between humans and wildlife. For example, WS may talk with residents of an area to eliminate the feeding of wildlife that occurs in parks, recreational sites, or residential areas to reduce damage by certain predators such as coyotes and bears. This includes inadvertent feeding allowed by improper disposal of garbage or leaving pet food outdoors where wildlife can feed on it. Many wildlife species adapt well to human settlements and activities, but their proximity to humans may result in damage to structures or threats to public health and safety. Eliminating wildlife feeding and handling can reduce potential problems, but many people who are not directly affected by problems caused by wildlife enjoy wild animals and engage in activities that encourage their presence.

Another example of human behavior modification is just assisting people that have a fear of an animal. WS receives calls about species such as large carnivores that are not causing damage. It is just a perceived threat to the callers even though the animal is in its natural habitat. WS personnel provide educational information and reassurance about these species.

Physical Exclusion

Physical exclusion methods restrict the access of wildlife to resources. These methods can provide effective prevention of wildlife damage in many situations.

Fencing. Fences are widely used to prevent damage from predators. Exclusionary fences constructed of

woven wire or multiple strands of electrified wire can be effective in keeping predators from some areas such as an airport. The size of the wire grid and height of the fence must be able to keep the predators out. In addition, an underground apron (i.e., fencing in the shape of an "L" going outward) about 2 feet down and 2 feet out helps make a fence more wildlife proof; the "L" keeps predators out that dig crawl holes under the fence. However, fencing has limitations. Even an electrified fence is not always wildlife-proof and the expense of the fencing can often exceed the benefit. In addition, if large areas are fenced, the wildlife being excluded has to be removed from the enclosed area to make it useful. Some fences inadvertently trap, catch or affect the movement of nontarget wildlife and may not be practical or legal in some areas (e.g., restricting access to public land).

Netting. Netting consists of placing wire nets (chicken wire-mesh), or potentially heavy duty plastic, around or over resources in a small area, likely to be damaged or that have a high value. Netting is typically used to protect areas such as livestock pens, fish ponds and raceways, and structures. Complete enclosure of ponds and raceways to exclude all predatory wildlife such as otters, minks, and raccoons typically requires wire mesh secured to frames or supported by overhead wires. Gates and other openings must also be covered. Complete enclosure of areas with netting can be very effective at reducing damage by excluding all problem species, but can be costly.

Wildlife Management

Reducing wildlife damage through wildlife management is achieved through the use of many techniques. The objective of this approach is to alter the behavior of or repel the target species, remove specific individuals from the population, reduce or suppress local population densities, or extirpate exotic species populations to eliminate or reduce the potential for loss or damage to resources.

Frightening Devices. Frightening devices are used to repel predators from an area where they are a damage risk (i.e., airport, livestock bedding areas). The success of frightening methods depends on an animal's fear of, and subsequent aversion to, offensive stimuli (Shivak and Martin 2001). A persistent effort is usually required to effectively apply frightening techniques and the techniques must be sufficiently varied to prolong their effectiveness. Over time, animals often habituate to commonly used scare tactics and ignore them (Pfeifer and Goos 1982, Conover 1982, Graves and Andelt 1987). In addition, in many cases animals frightened from one location become a problem at another. Scaring devices, for the most part, are directed at specific target species by specialists working in the field. However, several of these devices, such as scarecrows and propane exploders, are automated.

Harassment and other scaring methods to frighten animals are probably the oldest methods of combating wildlife damage. These devices may be either auditory or visual and generally only provide short-term relief from damage. A number of sophisticated techniques have been developed to scare or harass wildlife from an area. The use of noise-making devices (electronic distress sounds, alarm calls, propane cannons, and pyrotechnics) is the most popular. Other methods include harassment with visual stimuli (e.g., flashing or bright lights, scarecrows, human effigies, balloons, mylar tape, wind socks), vehicles, or people. Some methods such as the Electronic Guard use a combination of stimuli (siren and strobe light). These are used to frighten predators from the immediate vicinity of the damage prone area. As with other PDM efforts, these techniques tend to be more effective when used collectively in a varied regime rather than individually. However, the continued success of these methods frequently requires reinforcement by limited shooting (see Shooting).

Other frightening methods in use are rubber bullets and "bean bags" that are shot from shotguns. Rubber bullets and bean bags do not kill or pass through an animal, but are intended to hurt them enough to avoid a particular activity again. Rubber bullets and bean bags have been used mostly for nuisance predators (i.e., "garbage can bears"). When a predator associates being shot with raiding a garbage can or other nuisance activity, it is hoped that they will avoid that activity in the future. Rubber bullets or bean bags are used target-specifically.

Chemical Repellents. Chemical repellents are nonlethal chemical formulations used to discourage or disrupt particular behaviors of wildlife. Chemical repellents are categorized by their delivery mechanism: olfactory, taste, and tactile. Olfactory repellents must be inhaled to be effective. These are normally gases, or volatile liquids and granules, and require application to areas or surfaces that need protecting. Taste repellents are compounds (i.e., liquids, dusts, granules) that are normally applied to trees, shrubs, and other materials that are likely to be eaten or gnawed by the target species. Tactile repellents are normally thick, liquid-based substances which are applied to areas or surfaces to discourage travel of wildlife by causing irritation such as to the feet. Most repellents are ineffective or are short-lived in reducing or eliminating damage caused by wildlife, therefore, are not used very often by WS. The only repellents available for predators are unrestricted chemicals such as tobacco dust (i.e., F&B Rabbit and Dog Chaser®) and capsaicin from hot pepper (i.e., Hot Sauce®, Miller®) that are sold over-the-counter to the general public to repel dogs and cats from areas where they are not wanted (i.e. flower beds, gardens). New Mexico WS has not used any repellents in PDM and does not anticipate their use. Additionally, chemical repellents for the most part are nontoxic to the intended target species, nontargets, and the environment.

Capture or Take Methods. Several methods are available to capture or take offending predators. The appropriateness and efficacy of any technique will depend on a variety of factors.

Leghold Traps are versatile and widely used by WS in New Mexico for capturing many species. These traps can be used to live-capture a variety of animals. These are frequently used by WS to capture most all predators. Traps placed in the travel lanes of the targeted animal, using location to determine trap placement rather than attractants, are known as *"blind sets."* More frequently, traps are placed as *"baited"* or *"scented"* sets. These trap sets use an attractant consisting of visual attractants (e.g. feathers) or food bases, such as fetid meat, urine, or musk, to attract the animal. In some situations a "draw station," such as a carcass, animal parts, or a large piece of meat, is used to attract target predators. In this approach, one to several traps are placed in the vicinity of the draw station. APHIS-WS program policy prohibits the placement of traps closer than 30 feet to a draw station or visible bait (with the exception of traps placed for bears, cougars, or raptors) for the protection of scavenging birds. Advantages of the leg-hold trap are: 1) they can be set under a wide variety of conditions; 2) some targets can be relocated after capture; 3) nontarget captures can be released if it is deemed that they will survive; 4) traps can have padded jaws to reduce foot damage to predators, and 4) pan-tension devices can be used to reduce the probability of capturing nontarget animals smaller than the target species (Turkowski et al. 1984, Phillips and Gruver 1996). Disadvantages of using leg-hold traps include the difficulty of keeping them in operation during rain, snow, or freezing weather, and they lack selectivity where nontarget species are of a similar or slightly heavier weight as the target species (animals much larger than the target species usually can pull themselves free from leghold traps). The use of leghold traps also requires more time and labor than many other methods, but they are indispensable in resolving many depredation problems. Leghold traps have the potential to take some T&E species in New Mexico, and therefore, may affect them. Additionally, the type of attractant, bait or visual lure, used at a trap set could also increase the risk to particular nontarget species. For example, baits made with fish oil, anise

oil, catnip, and fresh meat, or visual attractants such as pieces of fur, feathers, or shiny metal or fabric are generally attractive to bobcats and would be more conducive to capturing other felids not intended to be captured.

Before leghold traps are employed, their limitations must be considered. Injury to target and nontarget animals, including livestock, may occur. Weather and the skill of the user will often determine the success or failure of the leghold trap in preventing or stopping wildlife damage. Various tension devices can be used to prevent animals smaller than target animals from springing the trap. Trap placement and bait selection can also contribute to minimizing nontarget take. However, livestock and nontarget animals may still be captured even with pan-tension devices and effective trap placement. These traps, though, usually permit the release of nontarget animals. Leghold traps pose a threat to a few T&E species and, therefore, measures to reduce their impact such as use of padded jaws and daily trap check are in place to protect these species.

Quick-Kill Traps come in a wide variety of styles and can be, but rarely, used in PDM (primarily for smaller predators. The primary trap used in PDM is the smaller Conibears® for the smaller predators such as mink in aquaculture facilities or skunks and raccoons in cubbies. WS policy prohibits the use of quick-kill traps with a jaw spread exceeding 8 inches (i.e., 330 Conibears®) for land sets. The Conibear® consists of a pair of rectangular wire frames that close like scissors when triggered, killing the captured animal with a quick body blow. Conibear® traps have the added features of being lightweight and easily set. Conibear® traps, depending on where they are placed, could have an impact on a few nontarget species.

Cage Traps come in a variety of styles for PDM to target different species. The most commonly known cage traps used in the current WS program are box traps. Box traps are usually rectangular, made from wood or heavy gauge wire mesh. These traps are used to capture animals alive and can often be used where many lethal or more dangerous tools would be too hazardous. Box traps are well suited for use in residential areas. Cage traps usually work best when baited with foods attractive to the target animal. They are used to capture animals ranging in size from mice to deer, but are usually impractical in capturing most large animals. However, large cage traps work well for capturing bears and suburban cougars, provided the traps can be transported by vehicle to the damage sites. On the other hand, cage traps are mostly ineffective for coyotes.

Cage traps have a few drawbacks. Some individual target animals avoid cage traps. Some nontarget animals become "trap happy" and purposely get captured to eat the bait, making the trap unavailable to catch target animals. These behaviors can make a cage trap less effective. Cage traps must be checked frequently to ensure that captured animals are not subjected to extreme environmental conditions; an animal may die quickly if the cage trap is placed in direct summertime sunlight. Another potential problem with the use of cage traps is that some animals will fight to escape and become injured. However, most all nontarget species can be released during trap checks. The 1992 USFWS BO (USDA 1997, Appendix F) had no concerns with the use of cage traps for T&E species.

Net Guns of various sizes have occasionally been used by APHIS-WS, primarily research, to catch target predators from aircraft or ground. These shoot from a "rifle with prongs," go about 20 yards, and wrap around the target animal. This technique is mostly used in research to capture animals that will be sampled or equipped with radio telemetry devices. These would most likely be used to assist in capturing particular species such as wolves or lynx for management purposes (i.e., returning them to appropriate habitat) with any applicable permit.

Snares made of wire or cable are among the oldest existing PDM tools. They can be used effectively to catch most species, but are most frequently used to capture coyotes, fox, cougars and bears. They are much lighter and easier to use than leg-hold traps and are not generally affected by inclement weather. Snares may be employed as either lethal or live-capture devices depending on how or where they are set. Snares set to capture an animal by the neck are usually lethal but "stops," devices to keep the snare loop from tightening to the extent that they would kill the animal, can be attached to the cable to make the snare a live capture device. Snares can incorporate a breakaway feature to release nontarget wildlife and livestock where the target animal is smaller than potential nontargets (Phillips 1996). These snares can be effectively used wherever a target animal moves through a restricted lane of travel (e.g., "crawls" under fences, trails through vegetation, or den entrances). When an animal moves forward into the loop formed by the cable, the noose tightens and the animal is held.

The foot or leg snare is a spring-powered nonlethal device, activated when an animal places its foot on the trigger. Foot snares are used effectively to capture large predators such as cougars and black bears. Additionally, several foot snare designs have been developed to capture smaller predators such as coyotes and bobcats. In some situations using snares to capture wildlife is impractical due to the behavior or morphology of the animal, or characteristics of the particular location of the wildlife damage situation. Snares must be set in locations where the likelihood of capturing nontarget animals is minimized.

Catch-poles are made of a snare cable on a pole that can be tightened around an animal to capture it by hand (typically diseased or entrapped animals) or safely handle predators to remove them from traps. This device consists of a hollow pipe with an internal cable or rope that forms an adjustable noose at one end. The free end of the cable or rope extends through a locking mechanism on the end opposite of the noose. By pulling on the free end of the cable or rope, the size of the noose is reduced sufficiently to hold an animal. Catch poles are used primarily to remove live animals from traps without danger to or from the captured animal.

Denning is the practice of seeking out the dens of depredating coyotes or red fox, excavating them, and destroying the young, adults, or both to stop or prevent depredations on livestock. Denning is used in coyote and fox damage management efforts, but is fairly limited because dens are often difficult to locate and den use by the target animal is restricted to about 2 to 3 months during the spring. Coyote depredations on livestock and poultry often increase in the spring and early summer because of the increased food requirements caused by the need to feed pups (Till 1982, Till and Knowlton 1983). The removal of pups often stops depredations, even though the adults may not be taken. When the adults are taken at or near a known den location, it is customary to euthanize the pups to prevent their starvation because they would be unable to survive on their own. Using this method, pups are removed from dens by excavation and then shot to the brain (not commonly conducted anymore), or they are killed in the den with a carbon monoxide-producing fumigant (discussed under chemical methods below). Den hunting for adult coyotes and their young is often combined with calling and shooting and aerial hunting. Denning is labor intensive with no guarantee of finding the den of the target animal. Denning is very target-specific and is most often used in open terrain where dens are comparatively easy to find.

Shooting is conducted with rifles, shotguns, and air guns and is very selective for the target species. Shooting is limited to locations where it is legal and safe to discharge firearms. Shooting is rarely used alone as the primary PDM method in a control operation because, for many species, opportunities to shoot a target animal are random and unpredictable, and especially problematical for nocturnal. However, shooting predators is frequently performed in conjunction with calling, particularly for coyotes, bobcats, and red fox.

Vocal calls, handheld mouth-blown calls, and electronic calls can be used to mimic the target species vocalizations (e.g., coyote howls and raccoons fighting) or prey (e.g., injured jackrabbit and chicken vocalizations). Trap-wise coyotes are often vulnerable to calling. Target animals are often lured into close range to the WS Specialist with calling making shooting much more effective.

Shooting in conjunction with night vision equipment including goggles or scopes is sometimes used in areas where traditional methods are unsuccessful or where chronic livestock depredation is occurring. Most of the predators are nocturnal are easier to take at night. Additionally, this method is especially effective in high daytime, public use areas where problems with predators are occurring and the use of PDM methods would make it unsafe for the public.

Lethal reinforcement through shooting is often necessary for successful frightening programs (see the discussion on shooting under Frightening Devices), though this is most often used for flocking birds rather than predators.

Aerial Shooting or aerial hunting (shooting from an aircraft) is a commonly used coyote and red fox damage management method on all lands where authorized and deemed appropriate; it especially effective in removing offending coyotes that have become "bait-shy" to trap sets or are not susceptible to calling and shooting. Aerial hunting consists of visually sighting target animals in the problem area and shooting them with a shotgun from an aircraft. Local depredation problems (particularly lamb and calf predation by coyotes) can often be resolved quickly through aerial hunting. Aerial hunting is species-selective and can be used for immediate damage relief, providing weather, terrain, and cover conditions are favorable. Aircraft are used to intercept and shoot coyotes or fox at locations where they have killed livestock. Aircraft are also used in searching for coyote dens. This method may also be used to reduce local coyote or bobcat populations in lambing and calving areas with a history of predation.

Cain et al. (1972) rated aerial hunting as *"very good"* in effectiveness for problem solving, safety, and lack of adverse environmental impacts. Connolly and O'Gara (1987) documented the efficacy of aerial hunting in taking confirmed sheep-killing coyotes. Wagner (1997) found that aerial hunting may be an especially appropriate tool as it reduces risks to nontarget animals and minimizes contact between damage management operations and recreationists. Wagner (1997) also stated that aerial hunting was an effective method for reducing livestock predation and that aerial hunting 3 to 6 months before sheep are grazed on an area was cost-effective when compared with areas without aerial hunting.

Good visibility and relatively clear and stable weather conditions are required for effective and safe aerial hunting. Summer conditions limit the effectiveness of aerial hunting as heat reduces coyote activity and visibility is greatly hampered by vegetative ground cover. Air temperature (high temperatures), which influences air density affects low-level flight safety and may also restrict aerial hunting activities.

Fixed-wing aircraft are useful over flat and gently rolling terrain. However, due to their maneuverability, helicopters have greater utility and are more effective over brush covered ground, timbered areas, steep terrain, or broken land where animals are more difficult to spot. In broken timber or deciduous ground cover, aerial hunting is more effective in winter when snow cover improves visibility or in early spring before the leaves emerge. Aerial hunting is most effective when ground support crews direct aircraft by radio to the general location of animals which have been located by eliciting coyote howls using sirens, calls, or recorded coyote howls. APHIS-WS aircraft guidelines have been implemented to ensure that aerial hunting programs

are conducted in a safe and environmentally sound manner and in accordance with Federal and State laws. Pilots and aircraft must be certified under established APHIS-WS program procedures. Only properly trained and certified APHIS-WS program employees are approved as aerial hunting crew members. Aerial hunting is generally perceived by the public as being more desirable than poisons, since shooting is selective and results in quick death. However, there is an inherent risk to aerial hunting crews. Aerial hunting has a negligible effect on the environment.

Hunting Dogs are frequently used in PDM to locate, pursue, or decoy animals. WS uses trailing/tracking, decoy, and trap-line companion dogs. Training and maintaining suitable dogs requires considerable skill, effort, and expense. There must be sufficient PDM needs for dogs to make the effort of training worthwhile.

Tracking Dogs or trailing dogs are commonly used to track and "tree" target wildlife species such as black bears, cougars, bobcats, and raccoons. Though not as common, they sometimes are trained to track coyotes (Rowley and Rowley 1987, Coolahan 1990). Dogs commonly used are different breeds of hounds such as blue tick, red-bone, and Walker. They become familiar with the scent of the animal they are to track and follow, and the dogs strike (howl) when they detect the scent. Tracking dogs are trained not to follow the scent of nontarget species. WS Specialists typically find the track of the target species at fresh kills or drive through the area of a kill site until the dogs strike. WS Specialists then put their dogs on the tracks of the predator. Typically, if the track is not too old, the dogs can follow the trail and "tree" the animal. When the dogs "tree" the animal, it usually seeks refuge up a tree, in a thicket on the ground, on rocks or a cliff, or in a hole. The dogs stay with the animal until the WS Specialists arrives and dispatches, tranquilizes, or releases it, depending on the situation. A possibility exists that dogs will switch to a fresher trail of a nontarget species while pursuing the target species. This can occur with any animal that they have been trained to follow, and can also occur with an animal that is similar to the target species. For example, dogs on the trail a bobcat could switch to a lynx, if they cross a fresher lynx-track. With this said, tracking dogs could potentially have an impact on nontarget species, though this risk can be minimized greatly by WS Specialists looking at the track prior to releasing the hounds and calling the dogs off a track if it is determined that they have switched tracks.

Decoy Dogs are frequently used in coyote damage management in conjunction with calling. Dogs are trained to spot, lightly engage, and lure coyotes into close shooting range for WS Specialists. Decoy dogs are especially effective for territorial pairs of coyotes. Decoy dogs are typically medium sized dogs such as small Labradors and mountain curs that are trained to stay relative close to the Specialist. These dogs typically will get close to coyotes but return when the coyotes start chasing them.

Trap-line Companion Dogs often accompany WS Specialists in the field while they are setting and checking equipment. They are especially effective in finding sites to set equipment by alerting their owners to areas where coyotes or other predators have traveled, urinated or defecated; these are often good sites to make sets. Trap-line companion dogs stay with the WS Specialists and most always have no effect on nontarget animals.

Relocation is the capturing of an animal with one of the nonlethal take methods and translocating the animal to a new site, far enough away so that the animal will not return. WS typically does not recommend relocation of common or dangerous wildlife for reasons discussed further in Section 3.3.6.2. Relocation is an important method for wildlife management, especially for the propagation of T&E or sensitive species. However, NMDGF or USFWS would make most decisions and establish policies for relocating wildlife and

these would be related to population goals for the different species.

Chemical Immobilizing and Euthanizing Drugs are important tools for managing wildlife. Under certain circumstances, WS personnel are involved in the capture of animals where the safety of the animal, personnel, or the public are compromised and chemical immobilization provides a good solution to reduce these risks. For example, chemical immobilization has often been used to take cougars, coyotes, and raccoons in residential areas where public safety is at risk. WS employees that use immobilizing drugs are certified for their use and follow the guidelines established in the APHIS-WS Field Operational Manual for the Use of Immobilization and Euthanasia Drugs. Telazol® (tiletamine) and Ketamine/Xylazine are immobilizing agents used by WS to capture and remove predators from a particular area. These are typically used in urban, recreational, and residential areas where the safe removal of a problem animal is most easily accomplished with a drug delivery system (e.g., darts from rifle, pistol, blow guns, or syringe pole). Immobilization is usually followed by release (i.e. after radio collaring a cougar for a study), relocation, or euthanasia. Euthanasia is usually performed with drugs such as Beuthanasia-D® or Fatal-Plus® which contain forms of sodium phenobarbital. Euthanized animals are disposed of by incineration or deep burial to avoid secondary hazards. Drugs are monitored closely and stored in locked boxes or cabinets according to APHIS-WS policies, and Department of Justice or Drug Enforcement Administration guidelines. Most drugs fall under restricted-use categories and must be used under the appropriate license from the U.S. Department of Justice, Drug Enforcement Administration. Since the use of immobilizing drugs requires the user to be in close quarters to the target animal, the take of nontargets is nullified.

Chemical Medication Drugs are being used by APHIS-WS nationally to treat animals that are infected with a disease or other malady, or prevent their spread such as rabies. APHIS-WS is involved in disease surveillance, monitoring, and management programs to assist in minimizing the spread of such disease and reduce the potential for humans to be infected. These may require that medication be given to wildlife through injections, or oral or topical applications. Oral treatments, if not administered directly by a tube, are often disguised in baits acceptable by the target animal. Risk assessments on drugs being used in the field are completed prior to their use, including potential side-effects to T&E species in the range of their use. APHIS-WS is using an oral rabies vaccine that is a genetically engineered recombinant vaccinia-rabies glycoprotein (Raboral V-RG® MERIAL, Inc.) vaccine currently licensed for use in raccoons in the United States and Canada and approved for experimental use in gray fox and coyotes in Texas. It is not currently being used by WS in New Mexico, but is likely to be. However, the vaccine has been extensively evaluated in the laboratory for safety in more than 50 vertebrate species with no adverse effects regardless of route or dose. If used in New Mexico to reduce the spread of rabies, it should have no adverse effects on nontarget species.

Chemical Pesticides have been developed to reduce or prevent wildlife damage and are widely used because they are often very effective at reducing or stopping damage. Although some pesticides are specific to certain groups of species (e.g. birds *vs.* mammals), pesticides are typically not species specific, and their use may be hazardous to nontarget species unless they are used with care by knowledgeable personnel. The proper placement, size, type of bait, and time of year are keys to selectivity and successful use of pesticides for PDM. When a pesticide is used according to its Environmental Protection Agency (EPA) registered label, it poses minimal risk to people, the environment, and nontarget species. WS personnel are required by policy to adhere to label requirements including any literature that accompanies the label, but is not attached to the product. WS personnel that use these chemicals must be certified as chemical applicators and are required to adhere to all certification requirements set forth by FIFRA and NMDA. EPA pesticide

registration requires rigorous testing to determine potential effects on humans and the environment including risks to nontarget species. Suitable pesticides for PDM are limited. Following are the pesticides used by WS in PDM.

M-44/Sodium Cyanide (EPA. Reg. No. 56228-15) is used in the M-44 device, a spring-activated ejector device developed specifically to kill coyotes and other canids. The M-44 is a mechanical device that ejects sodium cyanide powder into the mouth of an animal that pulls up on it with its teeth. The M-44 is made of four parts and is set with special pliers. It is selective for canids, which are members of the dog family, due to their feeding behavior (scavenging) and because the attractants used are relatively canid-specific. When properly used, the M-44 presents little risk to humans and the environment, and provides an additional tool to reduce predator damage. The M-44 device consists of: (1) a capsule holder wrapped with fur, cloth, or wool; (2) a capsule containing 0.8 gram of powdered sodium cyanide; (3) an ejector mechanism; and (4) a 5-7 inch hollow stake. The hollow stake is driven into the ground, the ejector unit is cocked and placed in the stake, and the capsule holder containing the cyanide capsule is screwed onto the ejector unit. A fetid meat or other suitable bait is spread on the capsule holder. An animal attracted by the bait will try to pick up or pull the baited capsule holder. When the M-44 device is pulled, a spring-activated plunger propels sodium cyanide into the animal's mouth. M-44 users carry an antidote kit, six amyl nitrite pearls, with them while setting out or checking the devices which when used counteracts the effect of an accidental exposure. WS personnel must be certified to use the M-44. The EPA label for the M-44 includes 26 use restrictions. Although the M-44 is selective for canids, WS takes some nontargets other than canids on rare occasions.

Large Gas Cartridges (EPA. Reg. No. 56228-21) are fumigant devices that emit gases to take burrowing wildlife and reduce damage associated with them. These are very efficient, but often expensive. In PDM, WS only uses gas cartridges in coyote, fox, and skunk dens. When ignited, the cartridge burns in the den of an animal and produces large amounts of carbon monoxide, a colorless, odorless, and tasteless, poisonous gas. The combination of oxygen depletion and carbon monoxide exposure kills the animals in the den. Carbon monoxide euthanasia is recognized as an approved and humane method to kill animals (American Veterinary Medical Association 1987). The APHIS-WS Program's Pocatello Supply Depot manufactures gas cartridges especially formulated for fumigation of dens. The cartridges are placed in the active burrows of target animals, the fuse is lit, and the entrance is then tightly sealed with soil. The burning cartridge causes death by oxygen depletion and carbon monoxide poisoning. WS would only use gas cartridges in dens that show signs of active target animal use. Therefore, these are mostly very target-specific and will, therefore, have no effect on nontarget species; however, WS does not use fumigants in ridge-nosed rattlesnake occupied habitat because of the remote potential that they could be inhabiting a coyote den.

Sodium Fluoroacetate/Livestock Protection Collar (EPA. Reg. No. 56228-22) , or Compound 1080, is currently used in the LPC to reduce coyote damage. The LPC is registered for WS and livestock producer use who have been specially trained and certified under FIFRA. LPC use is restricted to fenced pastures where coyote predation on sheep or goats has occurred. The LPC, attached to the neck of a sheep or goat, dispenses the toxicant when punctured by the bite of an attacking predator and is selective not only for the target species, but also for target individuals. It especially targets coyotes because they characteristically attack sheep and goats by grabbing the throat whereas other wildlife and dogs attack the animal elsewhere on the body (e.g., dogs attack the flanks and cougars the skull). As a result, fewer predators and nontarget animals are taken to resolve depredations on pastured sheep and goats. The LPC is used in New Mexico, but only infrequently.

Secondary poisoning risk is reduced because scavengers tend to feed preferentially in the thoracic cavity and hind portion of the carcass, while 1080 contamination would be primarily to the wool on the sheep's neck. A detailed risk assessment for sodium fluoroacetate in the LPC is provided in USDA (1997, Appendix P, 273-277) and concluded that use of the LPC would pose little likelihood of a dog being poisoned because they usually attack flanks and not the throat, and that secondary hazards were at most minimal. In addition, the LPC is not used extensively because it can only be used in very limited situations, as specified on the label.

The LPC consists of two rubber reservoirs, each of which contains about ½ oz. of a 1% solution of sodium fluoroacetate (Compound 1080). The advantage of the LPC is its selectivity in eliminating only those individual predators that are responsible for attacking sheep and goats. Disadvantages include the limited applicability of this technique, death of collared livestock that are attacked, the logistics of having to collar and monitor the collared livestock, and the management efforts required to protect livestock other than the target flock (Connolly et al. 1978, Burns et al. 1988). From an efficacy standpoint, use of the LPC is best justified in areas with a high frequency of predation (i.e., at least one kill per week) or flocks that are of high value such as registered livestock.

Sodium fluoroacetate has been a subject of wide research in the United States and elsewhere and has been widely used for pest management in many countries. Fluoroacetic acid and related chemicals occur naturally in plants in many parts of the world and are not readily absorbed through intact skin (Atzert 1971). Sodium fluoroacetate is discriminatingly toxic to predators, being many times more lethal to them than to most nontarget species (Atzert 1971, Connolly and Burns 1990).

3.2.2 Alternative 2 - No Federal WS PDM

This alternative would consist of no Federal involvement in PDM in New Mexico. Neither direct operational management nor technical assistance with the PDM methods described under Alternative 1 would be provided from WS. Information on future developments in nonlethal and lethal management techniques that culminate from WS's research branch would also not be available to producers or resource owners. Under this alternative, predator damage conflicts would be handled by NMDGF, NMDA, private resource owners and managers, private contractors, or other government agencies. It is probable that many PDM methods would be used unsafely and improperly such as the illegal use of pesticides simply out of frustration by resource owners over the inability to reduce damage losses to a tolerable level. This alternative is discussed in detail in USDA (1997).

3.2.3 Alternative 3 - Technical Assistance Only

This alternative would allow WS to provide technical assistance with PDM techniques, such as guard dogs, frightening devices, harassment, fencing, exclusion, animal husbandry, modification of human behavior, habitat modification, cage traps, leghold traps, neck snares, and chemical methods available for the public. WS would also loan equipment used for nonlethal PDM. WS would only be authorized to assist in lethal PDM activities where it was necessary for public safety. Lethal PDM methods and devices could be applied by persons with little or no training or experience. The use of inexperienced or untrained personnel could require more effort and cost to achieve the same level of problem resolution, and could cause harm to the environment, including a higher take of nontarget animals. As discussed in 3.2.2, many PDM methods could be used improperly because of the frustration of resource owners.

3.2.4 Alternative 4 - Nonlethal Required before Lethal Control

This alternative would require that: 1) resource owners show evidence of sustained and ongoing use of nonlethal or husbandry techniques aimed at preventing or reducing damage from predators, prior to receiving the services of WS; 2) WS personnel use or recommend appropriate nonlethal techniques in response to a confirmed damage situation prior to using lethal methods; and 3) lethal techniques be used only when the use of husbandry or nonlethal techniques had failed to keep resource losses below an acceptable level as indicated by the cooperator. This alternative is analyzed and discussed in USDA (1997). Producers would still have the option of implementing lethal PDM measures on their own and WS would continue to recommend lethal PDM when and where appropriate.

3.2.5 Alternative 5 - Corrective Control Only When Lethal PDM Methods are Used

This alternative would allow PDM only where predation on livestock or other damage from predators has occurred. Incumbent in this alternative is WS verification of the loss and the species responsible. Producers could still implement any legal nonlethal or lethal methods they determine to be practical and effective as they deem necessary. Lethal control by WS would be limited to an area near the loss to maintain the integrity of the corrective only situation. The full variety of mechanical and chemical PDM methods described for Alternative 1 would be available, once damage has occurred and the responsible species has been verified by WS.

3.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered but not analyzed in detail. These were not considered because of problems associated with their implementation as described below.

3.3.1 Compensation for Predator Damage Losses

The compensation alternative would require the establishment of a system to reimburse resource owners for predation or other losses. This alternative has been eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct control to reduce predator damage because losses would be compensated when damage was verified to be caused by predators. Aside from lack of legal authority, analysis of this alternative in USDA (1997) indicates that the concept has many drawbacks.

- It would require larger expenditures of money and manpower to investigate and validate all losses, and determine and administer appropriate compensation.
- It would be difficult, if not impossible, to assess and confirm losses in a timely manner for all requests, and, therefore, many losses could not be verified and would go uncompensated. Additionally, where compensation was paid, it would most likely be below full market value.
- Compensation would give little incentive to livestock and other resource owners to limit predation or damages with PDM strategies such as improved animal husbandry practices and fencing.
- Not all ranchers would rely completely on a compensation program and PDM activities including

lethal control would likely continue as permitted by state law.

- Congress has not appropriated funds to compensate for predation or other wildlife damage to agricultural products.

3.3.2 Bounties

Payment of funds for killing predators (bounties) suspected of causing economic losses is not supported by New Mexico State agencies such as NMDGF and NMDA as well as most wildlife professionals for many years (Latham 1960). WS concurs because bounties are generally not effective in abating damage, especially over a wide area such as New Mexico, but are good at removing surplus animals. A standard problem with bounties is that the circumstances surrounding the take of animals are typically arbitrary and completely unregulated; abuse is often common with bounty systems and many animals could come from places outside the bounty area. Finally, WS does not have the authority to establish a bounty program and would rely on the State or Counties to continue supporting bounties. It is likely that this system will be changed because of inherent problems with such a system to reduce damage.

3.3.3 Eradication and Long Term Population Suppression

An eradication alternative would direct all WS efforts toward total long term elimination of coyotes and perhaps other predator species in entire cooperating areas or larger defined areas in New Mexico. The eradication of predator species is not a desired goal of state or federal agencies. Some landowners would prefer that some species of predators be eradicated, especially those that have become abundant and caused damage without intervention from wildlife agencies (International Association of Fish and Wildlife Agencies 2004). However, eradication as a general objective for PDM will not be considered by WS in detail because WS, NMDGF, NMDA, USFWS, BLM, USFS, and most members of the public oppose eradication of any native wildlife species. Additionally, the eradication of a native species or local population would be extremely difficult, if not impossible to accomplish, and cost-prohibitive in most situations. It should be noted that coyotes, badgers, skunks, weasels, raccoons, and ringtails may be taken year-round with no restriction and furbearers can be taken at any time if they are found destroying livestock or poultry., and yet theses species have not been eradicated

Suppression would direct WS efforts toward managed reduction of certain problem populations or groups. In localized areas where damage can be attributed to predation by specific groups, CDOW has the authority to increase hunting seasons and hunter tag quotas. When a large number of requests for WDM are generated from a localized area, WS would consider suppression of the local population or groups of the offending species, if appropriate. It is not realistic, practical, or allowable under present WS policy to consider large-scale population suppression as the basis of WS. Typically, WS activities in Colorado are conducted on a very small portion of the area inhabited by the problem species, and therefore, eradication or long term population suppression is unrealistic altogether.

3.3.4 The Humane Society of the United States Alternative

The Humane Society of the United States has proposed an alternative that requires: 1) "permittees evidence sustained and ongoing use of nonlethal/husbandry techniques aimed at preventing or reducing predation prior to receiving the services of WS"; 2) "WS employees use or recommend as a priority the use of appropriate

nonlethal techniques in response to a confirmed damage situation"; 3) "lethal techniques are limited to calling and shooting and ground shooting, and used as a last resort when use of husbandry or other nonlethal PDM has failed to keep livestock losses below an acceptable level"; and 4) "establish higher levels of acceptable loss thresholds on public lands than for private lands".

The major components of the Humane Society of the United States proposed alternative have been analyzed in detail in the alternatives contained in this EA and through court rulings. This alternative would not allow for a full range of IWDM techniques to resolve wildlife damage. In addition, WS is charged by law to protect American agriculture, despite the cost of PDM. Further, in the case Southern Utah Wilderness Society et al. v. Hugh Thompson et al., U.S. Forest Service (Civil No. 92-C-0052A 1993), the court clearly stated that, "The agency need not show that a certain level of damage is occurring before it implements a *WS* Program. . . . Hence, to establish need for *WS*, the forest supervisors need only show that damage from predators is threatened." Thus, judicial precedence was set and found that it is not necessary to establish a criterion, such as percentage of loss of a herd to justify the need for PDM provided by *WS*. Proactive and reactive PDM actions are therefore justified by a reasonable determination that damage by predators is threatened. The alternatives selected for detailed analysis in this EA encompass a reasonable range as required by NEPA and include some of the suggestions in the Humane Society of the United States proposal. It is believed that inclusion of this alternative would not contribute new information or options for consideration and analysis that are not already being considered and available in IWDM as used by WS.

3.3.5 No PDM Within any Wilderness or Proposed Wilderness

Under the current WS program in New Mexico, the amount of PDM that occurs in wilderness areas is so minor that the effects of the No Action Alternative would not likely be significantly different from the effects of a "No PDM in Wilderness Areas" alternative. The minor amount of PDM that is conducted by WS in wilderness or proposed wilderness areas conforms to legislative and policy guidelines applicable to WS. WS and the land management agency meet annually to review work plans that delineate what, when, why and where wildlife damage management would be conducted. SOPs specific to this issue are listed in the table at the end of Chapter 3.

3.3.6 Management Techniques Not Considered for Use in the Integrated Wildlife Damage Management

3.3.6.1 Cougar Sport Harvest Alternative. An alternative to offer sport harvest of cougars where control is required, prior to WS involvement, was considered but rejected from detailed analysis. NMDGF has the authority to determine the most appropriate means to take depredating cougars. NMDGF has indicated that it is not completely feasible as a method of control for depredating cougars because of inherent problems taking the correct animal that is targeted and because a quick response is often required. NMDGF currently allows the take of certain depredating cougars or populations through sport hunting and will continue to do so.

3.3.6.2 Relocation Rather Than Killing of Problem Wildlife. Translocation may be appropriate in some situations (i.e., if the problem species' population is at very low levels, there is a suitable relocation site, and the additional dollars required for relocation can be obtained). However, those species that often cause damage problems (e.g., coyotes, black bears, cougars) are relatively abundant or are not native (e.g., feral cats) and relocation is not necessary for the maintenance of viable populations. Relocation may also result

in future depredations if the relocated animal encounters protected resources, and in some cases could require payment of damage compensation claims. Any decisions on relocation by WS of wildlife are coordinated with NMDGF and consultation with the appropriate land management agencies or manager where the animal is to be released before relocating wildlife to these lands.

The American Veterinary Medical Association, the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists oppose the relocation of mammals because disease transmission to a healthy local population is a risk from relocated animals, particularly for small mammals such as raccoons or skunks (Center for Disease Control 1990). Although relocation is not necessarily precluded in all cases, it would in many cases be logistically impractical and biologically unwise. Relocation of wildlife is also discouraged by APHIS-WS policy (WS Directive 2.501) because many factors affect the outcome such as stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats. However, there may be exceptions for relocating certain species. Relocation of damaging wildlife might be a viable solution and acceptable to the public especially with wildlife that are considered to be of high value such as T&E species.

3.3.6.3 Immunocontraceptives or Sterilization Should Be Used Instead of Lethal PDM. Contraceptive measures for mammals can be grouped into four categories: surgical sterilization, oral contraception, hormone implantation, and immunocontraception (the use of contraceptive vaccines). These techniques would require that each individual animal receive either single, multiple, or possibly daily treatment to successfully prevent conception. The use of oral contraception, hormone implantation, or immunocontraception would be subject to approval by Federal and State regulatory agencies.

These methods were not analyzed in detail in the EA because: (1) surgical sterilization would require that each animal be captured and sterilization conducted by licensed veterinarians and would therefore be extremely labor intensive and expensive; and (2) currently no Federally or State approved chemosterilants are available for operational use in PDM.

Bromley and Gese (2001a, b) conducted studies to determine if surgically sterilized coyotes would maintain territorially and pair bond behavior characteristics of intact coyotes, and if predation rates by sterilized coyote pairs would decrease. Their results suggested that behaviorally, sterile coyote pairs appeared to be no different than intact pairs except for predation rates on lambs. Reproductively intact coyote packs were 6 times more likely to prey on sheep than were sterilized packs (Bromley and Gese 2001b). They believed this occurred because sterile packs did not have to provision pups and food demands were lower. Therefore, sterilization could be an effective method to reduce lamb predation if enough alpha (breeding) pairs could be captured and sterilized. During Bromley and Gese's (2001a,b) studies: (1) they captured as many coyotes as possible from all packs on their study area, (2) they controlled coyote exploitation (mortality) on their study area and survival rates for coyotes were similar to those reported for mostly unexploited coyote populations, unlike most other areas, and (3) they concluded a more effective and economical method of sterilizing resident coyotes was needed to make this a practical management tool on a larger scale (Bromley and Gese 2001b).

As alternative methods of delivering sterilants are developed, sterilization may prove to be a more practical tool in some circumstances (DeLiberto et al. 1998). Reduction of local populations could conceivably be achieved through natural mortality combined with reduced fecundity. However, no predators would be killed directly with this method and treated predators could continue to cause damage. Populations of dispersing

predators would probably be unaffected.

Potential environmental concerns with chemical sterilization would still need to be addressed, including safety of genetically engineered vaccines to humans and other wildlife. At this time, chemical sterilization is controversial among wildlife biologists and many others. In any event, no contraceptive agents or methods are currently registered and, thus, are not legal for use or practical for use on predators in most areas. Should any become registered in the future, WS could consider them among the methods to be used in the PDM program. Any additional NEPA analyses deemed necessary at that time would be conducted. The use of contraceptives is not realistic at this point, since effective and legal methods of delivering contraceptives to predators are not yet available for operational use.

3.3.6.4 Lithium Chloride as an Aversive Agent. Lithium chloride has been tested as a taste aversion agent to condition coyotes to avoid livestock, especially sheep. Despite extensive research, the efficacy of this technique remains unproven (Conover et al. 1977, Sterner and Shumake 1978, Burns 1980, 1983, Burns and Connolly 1980, 1985, Horn 1983, Johnson 1984). In addition, lithium chloride is currently unregistered by EPA or NMDA, and therefore cannot be used or recommended for this purpose.

3.4 WS SOPs INCORPORATED INTO PDM TECHNIQUES

SOPs are any aspects of an action that serve to prevent, reduce, or compensate for negative impacts that otherwise might result from that action. The current program, nationwide and in New Mexico, uses many such SOPs. Many SOPs were discussed in detail in Chapter 5 of USDA (1997). The key SOPs are incorporated into all alternatives as applicable, except the No Federal WS PDM Alternative (Alternative 2). Most SOPs are instituted to abate specific issues while some are more general and relate to the overall program. WS's SOPs include those recommended or required by regulatory agencies such as EPA and these are listed where appropriate. Additionally, specific SOPs or measures that reduce the likelihood of take are in place to protect resources such as T&E species that are managed by WS's cooperating agencies (USFWS and NMDGF) are included in the lists below.

3.4.1 General SOPs Used by WS in PDM

- WS PDM activities in New Mexico are consistent with SOPs discussed in USDA (1997).
- WS complies with all applicable laws and regulations that pertain to working on federally managed lands.
- WS coordinates with Tribal officials for work on Tribal lands to identify and resolve any issues of concern with PDM.
- The use of PDM methods such as traps and snares conform to current rules and regulations administered by NMDGF.
- WS personnel adhere to all label requirements for toxicants. EPA labels have a section on T&E species and environmental considerations that must be followed for use and WS personnel will abide by these. These restrictions invariably preclude or reduce exposure to nontarget species, the public, and pets.

- The WS Decision Model (Slate et al. 1992)thought process as discussed in Section 1.5.5, which is designed to identify effective wildlife damage management strategies and their impacts, is consistently used.

3.4.2 WS's SOPs Specific to the Issues

The following is a summary of WS's SOPs that are specific to the issues listed in Chapter 2 of this document.

3.4.2.1 Effects on Target Predator Species Populations.

- PDM is directed toward localized populations or individual offending animals, depending on the species and magnitude of the problem, and not an attempt to eradicate populations in a large area or region.

- WS Specialists use specific trap types, lures, and placements that are most conducive for capturing the target animal.

- WS PDM kill is monitored. Consideration of "Total Harvest" and estimated population numbers of key species are used to assess cumulative effects to maintain the magnitude of harvest below the level that would impact the viability of populations of native species (see Chapter 4). WS provides data on total take of target animal numbers to other agencies (i.e., NMDGF, USFWS) as appropriate.

- Decisions to relocate or kill problem bear and cougars are made by NMDGF. In conflict situations involving an established threat to human safety or a verified loss of property, WS personnel get prior NMDGF approval.

- WS currently has agreements for PDM on less than 32% of the land area of New Mexico and generally takes target predators on less than 15% of the land area in any one year, and therefore, has no impact on target predator species on usually 85% of the land area in New Mexico.

3.4.2.2 Effects on Nontarget Species Populations, Including T&E Species.

- WS personnel are highly experienced and trained to select the most appropriate method(s) for taking problem animals with little impact on nontarget animals.

- Traps and snares are not set within 30 feet of exposed carcasses to prevent the capture of scavenging birds. The only exception to this policy is for the capture of cougar and black bear because the weight of these two target animals adequately allows foot capture device tension adjustments to exclude the capture of smaller nontarget animals such as scavenging birds.

- Foot snare trigger and leghold trap underpan-tension devices are used throughout the Program to reduce the capture of nontarget wildlife that weigh less than the target species.

- Breakaway snares, which are snares designed to break open and release when tension is exerted by a larger nontarget animal such as deer, antelope, or livestock, have been developed and are being

refined. These snares will be implemented into the WS program as appropriate.

- Nontarget animals captured in leghold traps or foot snares are released at the capture site unless it is determined by WS Specialists that the animal is not capable of self maintenance.

- WS Specialists use specific trap types, lures and placements that are conducive to capturing the target animal, while minimizing potential impact on nontarget species.

- WS personnel work with research programs to continue to improve the selectivity of management devices.

- PDM activities are directed at taking action against individual problem animals, or local populations to resolve problems associated with them. It is generally accepted that predators do not influence prey numbers substantially, rather the reversal tends to be true, in that the cyclic nature of most prey species may affect predator numbers (Clark 1972, Wagner and Stoddart 1972). This is especially true of highly fecund species such as rodents and rabbits, but less so for species such as deer and T&E species. However, the impact of predator removal in New Mexico will not likely impact prey species except potentially in very local areas and is assessed further in section 4.2.1.8.

- When working in an area that has T&E species or the potential for T&E species to be exposed to WDM methods, WS personnel will know how to identify sign of the target and T&E species and use WDM methods accordingly.

- WS has adopted and implemented all reasonable and prudent alternatives to protect the black-footed ferret that were identified by USFWS in their 1992 BO (USDA 1997, Appendix F).

- WS has adopted and implemented conservation measures outlined in the BO and Conference Opinion (USFWS 1998a) to protect the Mexican gray wolf, the potentially natural occurring and reintroduced populations.

- WS has adopted and implemented all reasonable and prudent alternatives and measures to protect the jaguar issued in a BO and amendment (USFWS 1999 a, b). WS in coordination with USFWS has mapped potential jaguar habitat in New Mexico.

- A primary T&E species of concern covered by the formal consultation that occurs in New Mexico is the bald eagle. WS has adopted and implemented all reasonable and prudent alternatives and measures and their terms and conditions to protect bald eagles that were identified by USFWS in their 1992 BO (USDA 1997, Appendix F).

- If a California condor is seen in New Mexico outside of the experimental range in Arizona, WS will implement the reasonable and prudent alternatives that were identified by USFWS in their 1992 BO (USDA 1997, Appendix F) to protect the condor.

- WS will use pan-tension devices on leghold traps to minimize the potential for capturing a lesser prairie chicken. Small predators will be captured in cage traps where necessary.

- WS personnel will not use rodent fumigants in the range of the ridge-nosed rattlesnake.

- Though lynx are not a listed species in New Mexico, Colorado WS will keep New Mexico WS informed of lynx locations in New Mexico so WS personnel can avoid them. WS for the most part will avoid trapping in lynx habitat.

3.4.2.3 Impacts on Public Safety, Pets, and the Environment.

- A formal risk assessment (USDA 1997, Appendix P) reported hazards to the public from PDM devices and activities are low.

- Public safety zones are delineated and defined by location or on AWP maps by BLM and USFS during the AWP review phase, as changes make them necessary. The public safety zone is one-quarter mile, or other appropriate distance, around any residence or community, county, state or federal highway, or developed recreation site. PDM conducted on federal lands within identified public safety zones will generally be limited to activity aimed at the protection of human health and safety. However, a land management agency or cooperator could request PDM activities in the public safety zone for an identified need. Depending of the situation and applicable laws and regulations, WS could provide them service. However, the land management agencies would be notified of PDM activities that involve methods of concern such as firearms, M-44s, dogs, and traps before these methods would be used in a public safety zone, unless specified otherwise in the AWP and as appropriate.

- All pesticides are registered with EPA and NDOA. WS employees will comply with each pesticide's directions and labeling, and EPA and NMDA rules and regulations.

- WS Specialists who use restricted use chemicals (i.e., pesticides or drugs) are trained and certified by program personnel, or other experts, in the safe and effective use of these materials under EPA and NMDA approved programs. WS employees who use chemicals participate in continuing education programs to keep abreast of developments and to maintain their certifications.

- M-44's and LPCs are used by WS personnel who are trained and have received state certification from NMDA to use sodium cyanide and sodium fluoroacetate. PDM activities that involve the use of these chemicals are conducted in accordance with NMDA and federal EPA regulations and label restrictions (USDA 1997 Appendix Q).

- Conspicuous, bilingual warning signs alerting people to the presence of traps, snares, M-44s, and LPCs are placed at major access points when they are set in the field.

3.4.2.4 Effects of PDM, especially Aerial Hunting Activities, on the Use of Public Lands for Recreation.

- WS would conduct PDM on SMAs only when and where a need exists and is requested. All PDM activities conducted in SMAs including WAs and WSAs would be in accordance with the MOUs between WS and other agencies, and all enacted rules and regulations that are applicable to WS.

- WS personnel follow all laws and regulations applicable to WS and use the AWP guidelines while conducting PDM activities on public lands. The AWPs include delineation of areas where certain methods may not be used during certain time periods when conflicts with recreational events may occur. If it were necessary to work in areas outside the planned area, the area manager or their representative would be contacted in a timely manner as appropriate.

- WS conducts PDM in accordance with all laws applicable to WS associated with public lands and for the areas specified in BLM RMPs and USFS LRMPs. The land managing agencies review the AWPs for consistency with their Plans.

- Vehicle access would be limited to existing roads, unless off-road travel is specifically allowed by the land managing agency and conforms with the LRMPs and RMPs.

- PDM in WAs would be in accordance with Wilderness Policies and MOUs applicable to WS PDM activities.

- WS does not anticipate conducting PDM in National Parks. The potential exists that a request could come from the National Park Service or NMDGF for responding to a threat to human health and safety or for research purposes.

- Should any of BLM's existing WSAs be officially designated as Wilderness Areas in the future, wildlife damage management would be performed in accordance with the enacting legislation and Wilderness rules and regulations that pertain to WS PDM.

- Should any of BLM's existing WSAs be officially dropped as a WSA, PDM would follow standard procedures for public lands and as specified in the AWP.

- In WSAs, WS work is limited to actions allowed in BLM's Interim Management Policy for Lands Under Wilderness Review (H-8550-1, III. G. 5.).

3.4.2.5 Humaneness of Methods Used by WS.

- Chemical immobilization and euthanasia procedures that do not cause pain or undue stress are used by certified personnel when practical.

- WS personnel attempt to kill captured target animals that are slated for lethal removal as quickly and humanely as possible. In most field situations, a shot to the brain with a small caliber firearm is performed which causes rapid unconsciousness followed by cessation of heart function and respiration. A well placed shot to the head is in concert with the American Veterinary Medical Association's definition of euthanasia (Beaver et al. 2001). In some situations, accepted chemical immobilization and euthanasia methods are used.

- Traps are set and inspected according to NMDGF regulations and WS policy.

- Research continues with the goal of improving the humaneness of PDM devices.

- WS take is monitored. Total animal take is considered in relation to the estimated population numbers of key species. These data are used to assess cumulative effects so as to maintain the magnitude of harvest below the level that could impact the viability of a population.

3.4.2.6 Effectiveness of WS.

- The cost effectiveness of different PDM methods and actions will be used to assist WS planning and decision making. Consideration will be given to different values such as selectivity and humaneness as well as overall monetary costs within the constraints of the financial resources available.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides the information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative discussed in Chapter 3 in relation to the issues identified for detailed analysis in Chapter 2.

4.1 ENVIRONMENTAL CONSEQUENCES

This section analyzes the environmental consequences of each alternative in comparison with the proposed action to determine if the real or potential impacts are greater, lesser or the same.

4.1.1 Cumulative and Unavoidable Impacts

Cumulative and unavoidable impacts will be discussed in relationship to each of the issues under the five alternatives. Of primary concern are the cumulative impacts to native species targeted by PDM and the potentially affected nontarget species analyzed in this chapter.

4.1.2 Nonsignificant Impacts

The following resource values within New Mexico are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality and quantity, floodplains, wetlands, other aquatic resources, visual resources, air quality, prime and unique farmlands, timber, and range. The current program and the other 4 alternatives will not cause major ground disturbance, physical destruction or damage to property, will not cause any or only minor alterations of property, wildlife habitat, or landscapes, and does not involve the sale, lease, or transfer of ownership of any property. The proposed methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. These resources will not be analyzed further

4.1.3 Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitments of resources are expected, other than the minor use of fuels for motor vehicles and other equipment, and similar materials. These will not be discussed further.

4.2 ISSUES ANALYZED IN DETAIL

The environmental consequences of the 5 alternatives are discussed below with emphasis on the issues given in Chapter 2. The comparison of alternatives will be used to make a selection of the most appropriate alternative for WS PDM activities in New Mexico. The alternative selected should be the most effective to meet the purpose and the need of the program as identified in Chapter 1 with the least environmental concerns.

4.2.1 Effects on Target Predator Populations

NEPA requires federal agencies to determine whether their actions have a "significant impact on the quality of the human environment." To adequately determine the impacts that this alternative would have on

predators, their populations and take cumulatively from known sources need to be analyzed. The authority for management of resident wildlife species has traditionally been a responsibility left to the states. NMDGF is the state agency with management responsibility over animals classified by state law as protected game or furbearers. NMDGF provided statistics on population trends and take, but could not provide any definitive estimates of population sizes for most species that could used for the purposes of the following analyses on impacts to populations. Therefore, WS used the best available information to produce reasonable estimates.

PDM targets specific species and cumulative effects on their populations as a result of these activities. An aspect, perhaps overriding, that is germane to the determination of "significance" under NEPA is the effect of the federal action on the *status quo* for the environment. The States have the authority to manage populations of resident wildlife species as they see fit without oversight or control by federal agencies with the exception of T&E species. Management direction for a given species can vary among states, and state management actions are not subject to NEPA compliance. Therefore, the *status quo* for the environment with respect to state-managed wildlife species is whatever management direction that is established by the States, and federal actions that are in accordance with State management, have no effect on the *status quo*. Also, wildlife populations are typically dynamic and can fluctuate even without harvest or control by humans. Therefore, the *status quo* for wildlife populations is fluctuation, both within and among years, which complicates determining the significance of human impact on such populations. Determining the significance of an action considering predator populations is highly variable depending on the species, its abundance and legal status. In addition, the management direction from the responsible agency is a determining factor. For example, a declining population of a resident wildlife species does not necessarily equate to a "significant impact" as defined by NEPA if the decline is collectively condoned or desired by the management agency (NMDGF manages most predators as discussed in Section 1.1) representing the people that live in the effected human population. It is reasonable and proper to rely on the representative form of government within a state as the established mechanism for determining the "collective" desires or endorsements of the people of a state. WS abides by this philosophy and defers to the collective desires of the people of the State of New Mexico by complying with State laws and regulations that govern the take or removal of resident wildlife. Although the analysis herein indicates predator populations are not being impacted to the point of causing a substantial decline, if at some point in the future they are, then such a decline would not constitute a "significant" impact as defined by NEPA so long as the actions that cause the decline are in accordance with State law, and concomitantly, with the collective desires of the people of the State.

As defined by NEPA implementing regulations, the "*human environment* shall be interpreted comprehensively to include the natural and physical environment *and the relationship of people with that environment*." (40 CFR 1508.14). Therefore, when a federal action agency analyzes its potential impacts on the "human environment," it is reasonable for that agency to compare not only the effects of the federal action, but also the potential impacts that occur or will occur in the absence of the federal action. This concept is applicable to situations involving federal assistance in managing damage associated with State-resident wildlife species or unprotected species.

4.2.1.1 Alternative 1 - Continue the Current Federal PDM Program. Under the Current Program Alternative, take by WS and others will be considered statewide providing a more comprehensive picture of impacts to predators. The 3 prior EAs and supplements (WS 1997a, b, c, 2001a, b, c) determined that PDM had no significant impacts to predators in any of the three Districts. This EA has been expanded to

include the entire state to determine if impacts are significant. The statewide level provides a more comprehensive and statistically sound look at cumulative impacts, especially because take by sportsmen and others in New Mexico is most easily obtained for the State; much data is kept by NMDGF for game management units which do not correspond to the WS Districts. Additionally, greater consistency of policies for public lands would allow more diversity in PDM application.

The methods used by WS to take target predators under the current program are the same as those that have been used in recent years and were described in Section 3.2.1.2 and prior EAs (WS 1997a, b, c, 2001a, b, c). The methods used in each damage situation depend on the species causing the damage and other factors including location, weather, and time of year as discussed in section 3.2. The methods include frightening devices, regular and padded-jaw leghold traps, cage traps, neck and foot snares, shooting, calling and shooting, aerial hunting, net guns, hunting dogs, M-44s (sodium cyanide), LPC (sodium fluoroacetate), and denning (gas cartridge). Other methods may additionally be used, but most of these would be incorporated by the resource owner.

WS conducts PDM annually for relatively few predator species, primarily 4, in New Mexico, but has the potential for dealing with several (17 species in last 7 FYs -Table 1). These species are listed in section 1.2 with general information about them and which agency, WS or NMDGF, has primary responsibility for responding to damage complaints that involve these species. The primary target species taken yearly in New Mexico are the coyote, bobcat, striped skunk, and cougar, and to a lesser extent raccoon, gray fox, and black bear. It should be noted that actually few cougars are taken by WS annually, but are included because there are relatively fewer of them because they are a larger predator. Most other target predators are taken by WS only on an occasional, if at all, basis. All target predators taken from FY98 to FY04 by WS in New Mexico are given in Table 6. Of the average target take for FY98 to FY04, coyotes represented 95%, bobcats 3%, striped skunks 1% and all others 1%. Of the 17 species of predators that invoked requests for assistance from FY98 to FY04 (Table 1), WS targeted and took an average of 9 species annually representing 13 different species over the 7 year period (Table 6).

Table 6. All target predators taken by WS in PDM from FY98 to FY04 on all land classes.

Target Predator Species Taken by WS in FY98-FY04																
YEAR	FY98		FY99		FY00		FY01		FY02		FY03		FY04		Average	
Species	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed	Killed	Freed
Coyote	6,219	-	7,265	1*	6,130	-	6,025	-	6,121	-	5,402	-	5,387	-	6,078	0
Bobcat	117	-	171	-	235	-	173	1	163	-	135	-	119	-	159	0
Striped Skunk	145	-	131	6	89	8	50	6	58	1	50	-	34	-	80	3
Cougar	10	-	19	-	18	-	19	-	14	-	24	-	18	-	17	0
Raccoon	28	2	8	20	6	8	8	10	4	5	1	1	-	5	8	7
Gray Fox	10	2	8	1	-	-	2	4	1	2	13	-	6	-	6	1
Black Bear	-	-	-	-	4	-	6	5*	9	-	2	1	-	-	3	1
Feral Dog	-	-	11	6	-	-	5	3	-	2	-	-	-	-	2	2
Badger	2	-	2	-	2	1	1	1	3	-	4	-	2	-	2	0
Red Fox	2	-	6	-	-	-	2	-	-	-	1	1	-	-	2	0
Feral Cat	-	-	-	-	1	26	-	-	-	-	-	-	-	-	0	4
Hog-nosed Skunk	1	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Ringtail	-	-	-	-	-	-	-	1	-	-	-	1	-	-	0	0

Target Predator Species Taken by WS in FY98-FY04															
Total	6,534	4	7,621	34	6,485	43	6,291	31	6,373	10	5,632	4	5,566	5	6,357	19

* Used a harassment method for 1

Table 7. Furbearers taken in the 2001-02 to 2003-04 fur season (BISON-M 2004) with take from the 1981-82 and 1991-92 fur season as a comparison.

Furbearers & Big Game Harvested in New Mexico and the Average for the 2000-01 to 2003-04 Seasons							
Year	1981-82	1991-92	2000-01	2001-02	2002-03	2003-04	Ave. 00-03
Badger	585	68	46	56	95	163	90
Black Bear	-	-	480	522	740	455	549
Bobcat	1,292	198	267	271	372	857	442
Coyote	9,149	1,488	2,680	2,197	2,423	3,575	2,719
Gray Fox	2,653	465	574	488	690	1,578	833
Kit Fox*	948	42	18	36	6	97	39
Red Fox	234	2	15	22	20	98	39
Swift Fox*	-	-	9	35	47	43	34
Cougar	-	-	231	232	269	230	241
Raccoon	726	164	430	191	192	157	243
Ringtail	774	16	41	25	27	119	53
Hognosed Skunk	49	13	10	10	33	46	25
Hooded Skunk**	31	12	27	21	3	1	13
Spotted Skunk	44	4	20	32	3	23	20
Striped Skunk**	1,023	112	315	410	323	265	328

* Swift and kit fox were combined in the 1981-82 and 1991-92 seasons.
** Data from 1981-82, 1990-91 and 1999-2000 seasons and average for 14 years only where data was kept separate from striped skunks.

For comparison and cumulative impacts analysis, the furbearers taken in the 2003-04 New Mexico and other fur seasons are compiled in Table 7 (BISON-M 2004). Fur harvest reflects the value of the fur, the relative abundance of the species, and the number of sportsmen in the field. Numbers from the 1981-82 season are given for purposes of comparison because these numbers give a representative figure of the harvest pressure that the furbearers can withstand without diminishing the population because their populations are still stable. The harvest pressure during the seasons in the late 1970s and early 1980s was much greater because of the high value of fur and, thus, the higher number of sportsmen in the field.

Coyote Population Impact Analysis. Coyotes are the species most frequently targeted by WS in New Mexico, primarily because they are WS's responsibility. They were responsible for the majority of requests for assistance (61%) and damage value (77%) from all the predators in New Mexico. As a result, this species makes up the largest percentage of the predator take (95%) (Table 6). A population model developed by Pitt et al. (2001) assessed the impact of removing a set proportion of the coyote population in one year and then allowing the population to recover (referred to as "pulse removal"). In the model, all populations recovered within 1 year when <60% of the population was removed. The population recovered within 5 years when 60-90% of the population was removed. Pitt et al. (2001) stated that actual coyote populations would recover even more quickly than the model indicated, because the model assumed coyote territories were retained even at low densities, that animals would not move out of their territories to mate, and that animals were not

allowed to move in from surrounding areas (no immigration). The model also did not allow for a reduction in natural mortality rates at low population densities. Pitt et al. (2001) also evaluated the impact of removing a set proportion of the population every year for 50 years (sustained removal). When the removal rate was <60% of the population, the population size was the same as for an unexploited population. However, a shift in population structure was noted. For example, the population with 50% removal had fewer transient animals, a younger age structure, and higher reproduction. Sustained removal rates of >70% of the population resulted in removal of the entire population after 7 years, but the authors acknowledged that annual removal of 70% of the population would become increasingly difficult at low densities. Because of the model limitations described above for pulse removal, natural populations are probably able to withstand greater levels of harvest than indicated by Pitt et al. (2001). These findings are consistent with an earlier model developed by Connolly and Longhurst (1975), and revisited by Connolly (1995) which indicated that coyote populations could withstand an annual removal of up to 70% of their numbers and still maintain a viable population.

Table 8. Cumulative coyote kill in New Mexico for WS and private harvest for FY01 to FY04.

COYOTE IMPACT ANALYSIS				
	FY01	FY02	FY03	FY04
Est. Population	120,000	120,000	120,000	120,000
WS Kill	6,025	6,121	5,402	5,387
WS Kill - % of pop.	5.0%	5.1%	4.5%	4.5%
Other Take (Kill)	2,680	2,197	2,423	3,575
Other Kill - % of pop.	2.2%	1.8%	2.0%	3.0%
Total Kill	8,705	8,318	7,825	8,962
Total Kill - % of pop.	7.3%	6.9%	6.5%	7.5%
Sustainable Harvest Level	70%	70%	70%	70%

Table 9. Index of coyote population in New Mexico derived from WS aerial hunting take from FY94 to FY04.

Coyotes Taken by New Mexico WS Aerial Hunting			
FY	Coyote Take	Hrs Flown	Coyotes/Hr
94	438	299	1.5
95	650	316	2.1
96	827	337	2.5
97	716	329	2.2
98	1,351	467	2.9
99	2,021	570	3.5
00	1,201	422	2.8
01	1,375	419	3.3
02	2,346	595	3.9
03	2,089	531	3.9
04	2,007	645	3.1
Ave.	1,366	448	3.0

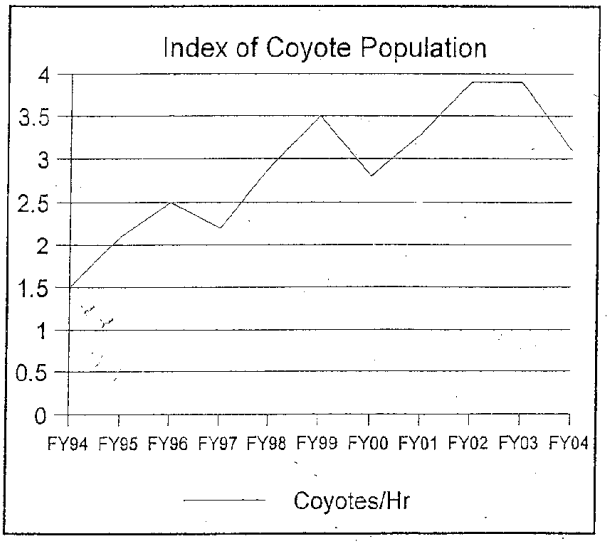

Figure 4. Coyotes taken with aerial hunting by WS provide an index of the coyote population in New Mexico.

WS has taken an average of 6,078 coyotes annually from FY98 to FY04 with a high of 7,265 in FY99. This is similar to the combined level of take analyzed in the three 1997 EAs (WS 1997a, b, c). Thus, the data indicate that WS's coyote take has remained basically stable with fluctuations ranging from 5,387 to 7,265 coyotes taken per year. Calculations using a conservative estimate for New Mexico's coyote population of 120,000 (Section 2.1.1.1) and data from WS's annual take and private harvest showed that the potential combined coyote take ranged from 6.5% to 7.5% (FY01 - FY04) of the population (Table 2), an eighth of the threshold of sustainable harvest. Therefore, WS concludes that WS PDM has had a low magnitude impact on the coyote population in New Mexico This conclusion is consistent with the U.S. General Accounting Office (1990) assessment regarding WS's impacts on coyote populations in the western U.S. Finally, harvest in the 1981-82 fur season was 9,149 coyotes more than the combined harvest today indicating the low magnitude of the current take because coyotes maintained their population even under that harvest pressure.

Another indicator, or index, of the status of the coyote population is to look at the number of coyotes taken per hour of aerial hunting; over the course of the year, the same percentage of hours are flown in similar months with the highest number of hours coinciding with lambing and calving in the spring. Table 9 gives the number of coyotes taken in aerial hunting and the number of hours flown hunting (does not include ferry time - the time to and from project areas). This gives a relative index of the coyote population and whether or not, over time, the population is decreasing, stable, or increasing. From FY94 to FY04, the coyote population in New Mexico appears to have had an increasing trend with normal fluctuations occurring between years (Figure 4), thus indicating that WS individually or cumulatively has not had an impact on the coyote population in New Mexico.

Cougar Population Impact Analysis. Cougars create the fourth greatest number of complaints in New Mexico, 53 annually from FY98 to FY04 (Table 1). To resolve these complaints, WS killed an average of 17 cougars per year from FY98 to FY04 (Table 6); additionally, WS killed an average of 1 nontarget annually during PDM (Table 4). Hunters harvested an average of 241 annually during the 2000-01 to 2003-04 seasons (Table 7). Various studies on cougar population dynamics provide insights into harvest levels that can be sustained by populations. The sustainable annual harvest level for cougar populations, determined by the USDA (1997) was 30%. Ashman et al. (1983) believed that under "moderate to heavy exploitation of 30%-50% removal", cougar populations for their study area in Nevada had the recruitment (reproduction and immigration) capability of rapidly replacing annual losses. Logan et al. (1996) determined the rate of increase in a New Mexico study varied from 8-11% in an unhunted, uncontrolled cougar population to 21-28% in a population where harvest and control was simulated by removing half of the cougars from the study area. They concluded that rates of increase in cougar populations are density dependent, meaning that, as a population declines in relation to carrying capacity, the rate of increase becomes greater. This is a natural mechanism of wildlife populations in general that serves to protect species by enhancing the ability of populations to recover from declines. The Logan et al. (1996) study suggested that, for a cougar population to remain at or near the maximum supported by the habitat, the carrying capacity, no more than 11% of the adults should be harvested per year. It also suggested that, for a population managed for control, the harvest level might need to exceed 28% per year to cause the population to decline. It appears that a viable population can be maintained at about 50% of carrying capacity with harvest levels that are at or below 21% or, in some years, as high as 28%. Populations of cougars are made up of territorial males and females, subadults, and transient cougars. At carrying capacity, the proportion

of the population comprised of subadults and transients (cougars without established territories) is generally greatest. Subadults and transients would be subject to intraspecific and other types of mortality that would reduce the population back to carrying capacity each year (Lindzey 1999).

Table 10. Cumulative cougar kill in New Mexico by WS (target and nontarget) and private harvest for FY01 to FY04.

COUGAR IMPACT ANALYSIS					
	FY01	FY02	FY03	FY04	Average
Est. Population	2,100	2,100	2,100	2,100	2,100
WS Take	20	14	24	20	20
Sportsmen Harvest	231	232	269	230	241
Total Take	251	246	293	250	260
WS Take - % of Pop.	1.0%	0.7%	1.1%	1.0%	0.9%
Total Take - % of Pop. population	12.0%	11.7%	14.0%	11.9%	12.4%
Sustainable Harvest Level	11-21%	11-21%	11-21%	11-21%	11-21%

The level of harvest statewide, sport and depredation, averaged 12.4% from FY01 to FY04 (Table 10) which is sustainable for a cougar population at or near carrying capacity and just over half the level that should be sustainable by a population that is at half of carrying capacity, as suggested by Logan et al. (1996). However, data from Logan et al. (1996) indicated that 89% of the cougar population (adults and subadults) in the San Andres mountains were adults. Therefore, the percentage of adults in the sport harvest is assumed to be no more than 89% which is possibly an overestimate. Available age data from the Arizona Game and Fish Department files for cougars harvested in Arizona from 1982 through 1987 showed that about 30% of the cougars taken were young, or, presumably, subadult cougars (J. Phelps, Ariz. Game & Fish Dept., pers. comm. 1998 *cited in* WS 1999b). This suggests harvest from hunted or controlled populations may have a higher proportion of subadults, and assuming only 11% subadults in the overall New Mexico harvest is probably lower than actual.

Further evidence that the cumulative harvest levels of past years has not affected the cougar population is shown by records of historic sportsmen harvests which have steadily increased from an average of 123/year for 1985-1996 (Rupp 1997 *cited in* BISON-M 2004) to an average of 241/year from FY01 to FY04 (Table 10); current take has somewhat stabilized at this higher level, about the desired objective of NMDGF. The fact that there have been enough cougars to maintain total harvest at increasing levels for so long a period is strong evidence that the State's cougar population has been near carrying capacity and able to withstand the levels of harvest and depredation take that have occurred.

NMDGF has management objectives for adult cougars in 16 Hunt Zones (Hunt Zone A-P) within New Mexico (Table 11). The objectives include a harvest quota for each Hunt Zone which is based on the estimated adult population and whether or not they are managing for a decreasing, stable, or increasing to the point of self-regulating population in that Hunt Zone. Hunt Zones are closed within 72 hours after the quota has been met. NMDGF has designated bighorn sheep ranges where cougar hunting can be conducted year-round without any quotas to reduce predation of bighorn sheep (Hunt Zone L and Game Management Units 29, 30, and 34). WS has no control over, and is not involved in the establishment of, the objectives. Additionally, state law requires that NMDGF respond to cougar damage complaints and allows a landowner or his/her agent to kill a cougar that has killed livestock or presents an immediate threat to people or property.

The take of cougars under this law requires that landowners contact NMDGF within 24 hours. NMDGF can reduce the quota in an area where they suspect an impact has occurred or vice versa, they can increase tags where the population is higher than the desired objective or decrease them where the quota was surpassed. WS has no ability to affect the number of cougars taken in different Hunt Zones because NMDGF sets harvest objectives according to the adult cougar population and monitors each Hunt Zone for impacts. Total cougar take in some of the Hunt Zones has sometimes surpassed the harvest objective for that zone (WS 2001a, b, c). However, harvest has been within the 21% harvest potential except in zones where the harvest objective was to reduce the population. For the sake of this analysis, and importance of the issue, some of the information from that analysis in WS (2001a, b, c) regarding cougar management is repeated below; however, WS is not looking at each Hunt Zone because NMDGF monitors take in each Hunt Zone and adjusts quotas accordingly to meet their objectives as the managing authority for cougars. WS has no control over population objectives set by NMDGF. Under NMDGF policy for managing depredating cougars, if WS was not involved, permits would have been issued to ranchers or private hunters to take these same animals. Thus sport harvest and depredation take are considered in Hunt Zones and would likely be similar with or without WS's assistance.

Table 11 provides the most recent data on cougar harvest in New Mexico from NMDGF (R. Winslow and B. Dunn, NMDGF, unpubl. data 2005). The harvest objective by sport hunters was not met in most zones, but was surpassed slightly in 2 zones. This gives a good indication that NMDGF is meeting their management objectives for cougar management in New Mexico.

Commitment by NMDGF to Maintain Viable Cougar Population. NMDGF is unequivocally committed to maintaining viable populations of cougars and is mandated to do so by 17-1-1 NMSA (letter dated March 24, 2000 from J. Maracchini, Director, NMDGF to A. Lara, State Director-NM, APHIS-WS). Thus, it appears that NMDGF's commitment to assuring viable populations of cougars in the State is well established and required by State law.

NMDGF has further demonstrated their commitment to assuring a viable cougar population by funding the 10-year study in the San Andres mountains by the Hornocker Wildlife Institute, and by establishing a zone management system that is in close alignment with several of the recommendations put forth by the Hornocker Institute following that study (Logan et al. 1996). The system sets population objectives and quotas for cougar harvest for each zone with the overall goal of maintaining a viable metapopulation[7] of cougars in the State. It allows for decrease of cougar subpopulations in some zones, maintenance in other zones, and increasing to the point self-regulating subpopulations in other zones. The harvest and population objectives in the zone management system are part of the overall direction NMDGF wants to take (B. Dunn, NMDGF, pers. comm. 2005).

NMDGF has identified areas in each zone that serve as refugia (areas where cougars are not hunted, i.e., National Parks, or hunted minimally such as in large wilderness areas. When these areas are at or surpass carrying capacity, cougars would disperse from these areas and repopulate other areas. Refugia or "safe areas" for cougars include Bandelier National Monument, Carlsbad Caverns National Park, Sevilleta NWR, Valle Vidal, and the following state wildlife areas: Urraca, Colin Neblett, Barker, Sargent, Humphreys,

7 A metapopulation is defined as a population distributed in subpopulations that are linked via movements of dispersing individuals (Logan et al. 1996).

Chama, Heart Bar, and Ft. Bayard. Although none of these areas are large enough to provide complete protection for cougars because they are not large enough to encompass their home ranges, they undoubtedly contribute to cougar survival and population maintenance to some degree. Also, no cougar harvest or depredation control is allowed on the Navajo Indian Reservation which occupies more than 4,000 mi^2 in the northwest corner of New Mexico (G. Notah, Director, Navajo Fish and Wildlife, pers. comm. 2005). Although some of the Navajo lands are not suitable cougar habitat, cougars are believed to currently occur on Navajo lands and prey on elk, deer, and livestock; these are also available to support the overall cougar population in New Mexico. Thus, it appears there is an adequate amount of unexploited cougar habitat in the State to meet the "refuge area" considerations of Logan et al. (1996).

Effect of WS Program on the Environmental *Status Quo* with Respect to the Cougar Population. The New Mexico State Game and Fish Commission and NMDGF were given management authority over cougars and most other wildlife species by State law (NMSA 17-2-3) which was passed via the State's system of representative government. That system was established to represent the *collective desires* of the people of the State of New Mexico with respect to the management of certain wildlife species. In this way, the State determines its desires for that component of the human environment which is comprised of resident wildlife species. The federal WS program recognizes and honors the right of the state of New Mexico to manage resident wildlife species. WS therefore has a policy of abiding by state laws and works cooperatively with the State's wildlife management agencies to assure WS's impacts on resident wildlife species are within those desired by the State. Therefore, the *status quo* for the environment with respect to state-managed wildlife species is the management direction that is established by New Mexico, and federal actions that are in accordance with the State's management desires have no effect on the *status quo*.

In the case of cougar damage management, WS only targets cougars when specifically permitted by NMDGF to do so on a case-by-case basis. The only exception to this "case-by-case basis" is in Game Management 30 in Hunt Zone I where the New Mexico Game and Fish Commission has authorized the preventive removal of up to 20 cougars per year to reduce livestock depredations. In that area, WS generally takes several of the 20 cougars each year as part of that program under the direction of NMDGF. WS occasionally kills a nontarget cougar during PDM with traps, snares, or M-44s. Those nontargets are authorized by NMDGF through a permit or general letter of authorization which covers the WS program for incidental take of state-protected species. In any event, all cougars taken by WS are authorized by NMDGF. In a case involving the permitting of cougar hunting guides to operate on National Forest Land, the 9th Circuit Court of Appeals affirmed a lower court decision, holding that since the state alone determines the number of cougars to be killed, the federal action at issue simply did not rise to the level of a major federal action with a significant effect on the environment (U.S. Court of Appeals for the Ninth District 1992). The situation regarding WS's take of cougars in New Mexico is similar in that the State determines or controls the numbers to be killed in any one year. Because WS only takes cougars as authorized by NMDGF, and because NMDGF's management system allows for virtually the same impacts on cougar populations with or without involvement by the federal WS program, the WS program has virtually no adverse effect on the *status quo* for the cougar population in the State. Thus, a decision by WS to reduce or discontinue involvement in cougar management would not reduce cumulative impacts on the cougar population in the State.

Table 11. Cougar take in the 2004-2005 season in New Mexico which includes WS take (R. Winslow and B. Dunn, NMDGF, unpubl. data 2005).

Zone[1]	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Total
2004-05 COUGAR HARVEST AND OBJECTIVES																	
GMU's In Zone	2,7	5, 50, 51	43-46, 48, 49, 53-55*	41, 42, 47	9, 10	6, 8	13, 14, 17	19, 20, 28, 29	18, 30, 34, 36-38	15, 16, 21, 25	22-24	26, 27	31-33, 39, 40	4, 52	12	56-58	
GMU of Kill (#/Sex)	2(3F, 8M)	5(3 F, 7M),50 (2F), 51(5 M, 5F)	43 (1M), 44 (2M, 2F), 45(1F, 2M),46 (1F, 2M), 49 (1F, 2M), 53 (1F,1M), 54 (1F), 55 (3F,10M)	41 (1F), 42 (1M), 47 (4F)	9 (2F),10 (2M, 1F)	6(10M,8F), 8 (1F, 1M)	13 (6M), 14 (2M),17(6 M, 8F)	19 (1F,1M), 20 (2F, 2M)	18 (3F), 30 (5M, 7F), 34 (4M, 1F), 36 (1F), 37(2F, 3M), 38 (1F, 2M)	15 (1F,4M)1 6 (5F, 2M)21 (5M, 6F)	22 (1M), 23 (2F, 6M), 24 (3F, 5M)	26 (2F, 1M) 27 (2M)	39 (1F), 40 (1 F)	4 (1F,2M), 52(1F)	-	58 (1M)	
Sport Harvest[2]	10	22	27	5	2	18	10	-	16	18	13	-	1	2	-	1	145
Bighorn Range**	-	-	-	-	-	-	5	5	-	-	1	2	-	-	-	-	13
Private Land**	-	-	3	-	2	-	4	-	3	3	2	-	1	2	-	-	20
Dep. Take	-	-	2	1	1	1	3	-	10	1	1	3	-	-	-	-	23
Road kill	1	-	-	-	-	1	-	1	-	1	-	-	-	-	-	-	4
Total Kills	11	22	32	6	5	20	22	6	29	23	15	5	2	4	0	1	205
Sport Quota	18	20	38	9	16	16	17	3	20	38	22	None	5	3	3	5	233
Left	8	-2	11	4	14	-2	7	3	4	20	9	N/A	4	1	3	4	88
Zone Status (O = Open, C=Closed)	O	C 3/21/05	O	O	O	C 1/20/05	O	O	O	O	O	O	O	O	O	O	
COUGAR HARVEST MANAGEMENT OBJECTIVES FOR 2005-2010																	
Pop Est-min-max	48-202	39-57	122-262	21-100	61-93	84-111	64-209	57-139	128-242	189-228	55-96	24-72	25-231	40-45	6-75	12-46	975-2,208
Management Obj.	15% Maintain	20% Maintain	20% Maintain	30% Decrease	30% Decrease	20% Maintain	30% Decrease	5% Self-regulate	30% Decrease	15% Maintain	20% Maintain	30% Decrease	5% Self-regulate	15% Maintain	10% Self-regulate	20% Maintain	
Harvest Quota	15	10	38	18	23	20	40	5	55	31	15	14	7	6	4	6	307
Max Density/mi[2]	4.5	4.5.	4.5	2.5	4.5	4.5	4.0	4.0	4.5	4.5	4.0	4.0	2.5	4.5	4.0	4.0	
Season	Oct-Mar	Oct-Mar	Oct-Mar	Oct-Mar	Oct-Mar	Oct-Mar	Oct-Mar	Oct-Mar	Yearround	Oct-Mar	Oct-Mar	Yearround	Oct-Mar	Oct-Mar	Oct-Mar	Oct-Mar	

The Population Estimate (Pop Est) is the minimum and maximum number of adult cougars that a zone is likely to have as determined by NMDGF (B. Dunn NMDGF, pers. comm. 2005).

*Valle Vidal is NOT open to cougar hunting.

**Cougars killed in Bighorn Sheep ranges or on private land do not apply to the quota.

1 - All zones except M and P have refugia where cougars are not hunted

2 - See "Rules and Information" booklet for specific hunting regulations.

How the WS Program Involvement in Cougar Depredation Management May *Benefit* Maintaining a Viable Cougar Population in New Mexico. NMDGF uses the WS program to take offending cougars that have preyed on livestock and remove some cougars in GMU 30 for damage prevention. The contract with WS allows NMDGF to issue a special permit for the take of offending cougars and allows them time to assess the overall impact to the cougar population at any given point in time. Without the contract, or with an unwillingness of landowners to use WS, landowners could kill any cougar that poses a threat to livestock or persons under NMSA 17-2-7.2 and 17-2-7B. If a landowner exercises that authority, NMDGF would likely not be afforded the opportunity to do an assessment of the impact on the cougar populations prior to the harvest. NMDGF has stated that this contract is the best means available to them to monitor and control mortality of cougars resulting from depredation incidents and is an important tool to assure continued viability of cougar populations (letter dated March 24, 2000 from J. Maracchini, Director, NMDGF to A. Lara, State Director-NM, APHIS-WS). Therefore, it appears that WS's involvement in cougar management in the State contributes to the State wildlife agency's overall ability to assure that a viable population of cougars is maintained.

Accuracy of Cougar Population Estimates. The current state of the art in cougar management does not allow for accurate population estimates for general management purposes. Cougars are exceedingly difficult to census or study because they are cryptic (highly secretive and difficult to observe), solitary, and live at low densities in rugged or densely vegetated habitat (Logan et al. 1996). This means they cannot be readily observed from the ground or aircraft for purposes of counting their numbers or to monitor population trends (Logan et al. 1996). Logan et al. (1996) used intensive capture-mark-recapture and radio-telemetry techniques to estimate and describe the cougar population in the San Andres Mountains, which is generally accepted as the most reliable means currently available for estimating cougar numbers. Logan et al. (1996) stated their methods were too expensive and time consuming to apply to larger regions for the purpose of monitoring populations. Their study cost an average of $100,000 per year ($1,000,000 over the 10 years of the study) for just one small portion of the cougar habitat in New Mexico. Track counts have been used by some researchers to estimate population densities (Cunningham et al. 1996 *cited in* BISON-M 2004), but even that technique can require extensive costs to detect even 30% changes in track densities (Beier and Cunningham 1996 *cited in* Logan et al.).

Therefore, the best scientific information currently available for estimating the cougar population in the State is that which can be derived from the 10-year study by Logan et al. (1996). These types of estimates have been described as educated guesses or "conceptual inventories" that, because of their uncertainties, are useful only for setting initial management objectives (letter dated May 20, 1998 from K. Logan, Hornocker Wildlife Institute to A. Lara, State Director-NM, WS). NMDGF (B. Dunn, NMDGF, *unpubl. data* 2005) has assumed that cougars inhabit almost all areas that deer inhabit in the State which is 56,700 mi^2. For an adult population of 2,200, this would result a density of 3.9 adult cougars per 100 $mi.^2$ which is in the middle of the range of 2.4 to 5.4 adults per 100 $mi.^2$ that Logan et. al (1996) found in the San Andres Mountains and the average of estimates.

Consideration of Sustainable Harvest Rates for Cougars. USDA (1997) reported a sustainable harvest level for cougar populations to be 30% per year. However, the senior author of the 10-year cougar study in the San Andres mountains has pointed out deficiencies in the studies used by WS to arrive at the 30% sustainable harvest level (letter dated April 18, 1997 from K. Logan, Hornocker Wildlife Institute to E. Jennings, Animal Protection of NM). Logan et al. (1996) reported that the rate of increase in the unhunted,

uncontrolled population in the San Andres mountains averaged 17% per year for the first 4 years of the study, and then dropped to 5% per year for the last 4 years. The authors felt the slowing of the rate of increase was because the population approached carrying capacity or that carrying capacity dropped because of lower prey availability resulting from drought. The average rate of increase for the population was about 11% over the entire study (Logan et al. 1996). The authors recommended that to maintain a sustained harvest of cougars, annual harvest should not exceed 8% of the adult males and the harvest of females should be strictly controlled. The senior author of the study suggested a maximum sustainable harvest level would be 11% of the adult portion of the population (letter dated May 6, 1997 from K. Logan, Hornocker Wildlife Institute to E. Jennings, Animal Protection of New Mexico). NMDGF has established harvest objectives at just under 11% of the estimated adult cougar population in zones where the objective is to maintain the population and 21% of adults in several zones where the objective is to decrease the population. A general rule that has been applied to all sport cougar hunting is that any spotted kittens or females accompanied by spotted kittens may not be taken (New Mexico Game and Fish Commission Big Game Reg. 31.8, item 12.3).

The harvest level set for zones where maintenance is the objective (11% of adults with limited protection of adult females with cubs) is somewhat more liberal than that recommended by the Hornocker researchers in Logan et al. (1996). However, it is consistent with the maximum sustainable harvest level identified by the senior author of the study (letter dated May 6, 1997 from K. Logan, Hornocker Wildlife Institute to E. Jennings, Animal Protection of NM). Harvest objectives were set by NMDGF based on individual zone population objectives that were identified as "self-regulate," "maintain," or "decrease." Although harvest objectives were based on numbers of adult cougars, ages of cougars taken were not obtained, with the exception of a portion of those taken for depredation purposes. Thus, the percentage of adults in the sport harvest and much of the depredation take is unknown. However, data from Logan et al. (1996) indicated that 89% of the adult plus subadult cougars in the San Andres mountains were adults. Available age data from the Arizona Game and Fish Department files for cougars harvested in Arizona from 1982 through 1987 showed that about 30% of the cougars taken were young, or, presumably, subadult cougars (WS 1999b). Therefore, the percentage of adults in the sport and other harvest is assumed to probably be no more than 89%. Thus, some cougar take would be subadults and subadults were not included in the estimated subpopulations of cougars in New Mexico. If sport and depredation take was at least 11% subadults as suggested by Logan et al.'s data, the take of an average of 12.4% of NMDGF's estimated population would be 11.0% of the estimated adult population from FY01 to FY04. This would be the allowable harvest for a cougar population at carrying capacity and 10% less than the allowable harvest for a cougar population below.

Cougar Population Impacts – Conclusions. Total cougar take from FY01 to FY04 was slightly greater than the 11% harvest rate suggested by Logan et al. (1996) for a cougar population at carrying capacity. If continued over the long term, this level of harvest could potentially lead to a decline in the overall population under NMDGF's current assumptions. Continued monitoring of cougar harvests and adjustments in harvest quotas when necessary to meet management objectives are mechanisms that NMDGF is expected to implement to assure a viable population is maintained. By monitoring harvest and demographic parameters (i.e, age and sex) of harvested cougars, NMDGF will be able to make inferences about harvest/control effects on populations and adjust harvest quotas if necessary to meet population objectives. If management turns out to be in error and results in over harvest in some areas, the "refuge" zones constitute insurance against jeopardizing the viability of the overall metapopulation.

A "viable" population can exist at many levels between one that is at carrying capacity and one that is at only a fraction of carrying capacity. Because rates of increase are density dependent (i.e., the population grows at a faster rate as the population is reduced in relation to carrying capacity), cougar populations have the ability to recover from declines that might result from mistakes in management. History has born this out by the fact that historical efforts to eradicate cougars in the early half of this century failed to do so, although cougar numbers were most likely reduced substantially (Evans 1983). Density dependant rate of increase is a built-in mechanism of most wildlife populations that serves to minimize effects of population reductions whether by harvest, localized control, or by non-man-induced mortality. This provides additional assurance that a viable population will be maintained in the State, even if a sustainable harvest rate is exceeded for a few years in areas where the objective is to maintain the population.

From a NEPA standpoint, justification for a finding of "no significant impact on the quality of the human environment" with respect to WS's take of cougars in New Mexico is the fact that WS's involvement has no adverse effect on the *status quo* because, if WS was not available, NMDGF would take, or issue permits to take, virtually the same cougars that are killed by WS. NMDGF believes that WS's involvement actually *benefits* their ability to control cougar mortality by encouraging livestock owners to rely on government assistance in resolving depredation problems instead of killing cougars themselves as allowed under state law. This suggests that, if WS stopped its involvement in cougar management in the State, there would be virtually no change in environmental effects or in cumulative environmental effects other than to perhaps result in worse effects on the cougar population by encouraging more private control actions as allowed under state law.

Bobcat Population Impact Analysis. WS received the third most number of requests for bobcats in New Mexico from FY98 to FY04, an annual average of 92 (Table 1). In response to these requests, WS took an average of 159 target bobcats (Table 6). WS also killed an average of 5 nontarget bobcats annually, incidental to PDM (Table 4). Hunters harvested an average of 442 annually from FY01 to FY04 (Table 7). The highest cumulative impact from FY01 to FY04 was in FY04 as harvest increased most likely as a result of higher fur prices; this represents an estimated 4.2% take (Table 12) of the estimated population of 23,500 (Section 2.1.1.3). USDA (1997) reported a sustainable harvest level for bobcat populations of 20%. Therefore, total harvest could increase almost five-fold without having an effect on the population. Historic harvest of bobcats was higher and in the 1981-82 season was about 1,300 (Table 7). This did not eliminate the bobcat population and harvest has remained lower than the historic harvest levels. WS kill and cumulative harvest in New Mexico from FY01 to FY04 has been less than 1% and 5% of the population, respectively, and would be considered a low component of overall bobcat mortality, and could increase fourfold combined. Even if PDM activities were increased ten-fold in New Mexico, the bobcat population would remain unaffected, assuming sportsmen harvest did not increase substantially. Thus, bobcat population impacts of the current program are of low magnitude and would remain low in the reasonably foreseeable future.

Table 12. Cumulative bobcat kill in New Mexico by WS (target and nontarget) and private harvest for FY01 to FY04.

BOBCAT IMPACT ANALYSIS				
	FY01	FY02	FY03	FY04
Est. Population	23,500	23,500	23,500	23,500
WS Take	176	168	136	122
Sportsmen Harvest	267	271	372	857

BOBCAT IMPACT ANALYSIS				
Total Take	443	439	508	979
WS Take - % of Pop.	0.7%	0.7%	0.6%	0.5%
Total Take - % of Pop. population	1.9%	1.9%	2.2%	4.2%
Sustainable Harvest Level	20%	20%	20%	20%

Skunk Populations Impact Analyses. WS received the second most number of requests for assistance for striped skunks, 113, of the predators from FY98 to FY04 (Table 1), but they do not cause as much damage value-wise as the previous species. Of the four, potentially five, species of skunks, WS receives almost all requests for assistance to resolve problems with striped skunks. WS rarely receives complaints for the other species. The striped skunk population was estimated at 88,400 (Section 2.1.1.3). WS took an average of 83 target striped skunks, killed and relocated, in New Mexico from FY98 to FY04 with a high, of 145 in FY98 (Table 6). Additionally, WS took an average of 3 striped skunks as nontargets during PDM (Table 4). Sportsmen take was higher averaging 326 from the 2000-01 to 2003-04 seasons and was highest in 2001-02 season at 410 (Table 7); the highest cumulative take never exceeded 1% of the estimated population (Table 13). Skunk populations reportedly can sustain a 60% annual harvest level indefinitely (Boddicker 1980); however, USDA (1997) did not determine a definitive harvest level. Because this level of harvest is substantially less than the sustainable harvest level, cumulative impacts are likely of a very low magnitude.

Table 13. Cumulative striped skunk kill in New Mexico by WS (target and nontarget) and private harvest for FY01 to FY04.

STRIPED SKUNK IMPACT ANALYSIS				
	FY01	FY02	FY03	FY04
Est. Population	99,000	99,000	99,000	99,000
WS Take	176	81	67	43
Sportsmen Harvest	315	410	323	265
Total Take	491	491	390	308
WS Take - % of Pop.	0.2%	0.1%	0.1%	0.0%
Total Take - % of Pop. population	0.5%	0.5%	0.4%	0.3%
Sustainable Harvest Level	60%	60%	60%	60%

Spotted skunks are not the target of PDM often, but WS did take 1 nontarget western spotted skunk from FY01 to FY04 (in FY01). An average of 20 spotted skunks (most likely all western) were harvested during hunting and trapping seasons from 2000-01 to 2003-04 seasons. With an estimated population of 19,300 for western spotted skunks (Section 2.1.1.4), cumulative impacts could be considered extremely low with the highest cumulative impact in FY02 at 0.2%. WS and sportsmen would have to increase take of western spotted skunks is of low magnitude and expected to remain low in the reasonable foreseeable future.

WS received 1 complaint for a hog-nosed skunk and killed 1 in FY98, and also took 1 nontarget in FY01. An average of 15 hog-nosed skunks were harvested by sportsmen from 2000-01 to 2003-04 seasons. With an estimated population of 37,500 hog-nosed skunks (Section 2.1.1.4), cumulative impacts could be considered extremely low with the highest cumulative impact in FY04 at 0.1%. WS and sportsmen would have to increase take of hog-nosed skunks considerably, more than a hundredfold, before a significant impact would be seen.

WS did not receive any complaints or take either the hooded skunk or eastern spotted skunk from FY98 to FY04. Sportsmen harvested an average of 13 hooded skunks from 2000-01 to 20003-04 seasons with the highest take in FY01 at 0.4% of their estimated population of 6,400 (Section 2.1.1.4). As can be seen intuitively, this take would be of insignificant in terms of their population. It is unknown whether or not any of the spotted skunks taken were eastern, but likely not (BISON-M 2004). Therefore, it is likely that no impact occurred to their possible presence in the northeastern part of New Mexico.

WS concludes that it has had low magnitude impacts on the skunk species in New Mexico. Take on all species would have to increase substantially before an impact would occur. At some point in the future, it may be likely that WS could get involved in a skunk rabies control program, administering rabies vaccinia via oral drop baits. This would have a beneficial effect on the skunk populations and people in New Mexico.

Black Bear Population Impact Analysis. WS receives a fair number of requests for assistance (25 ave. from FY98 to FY04) for black bears in New Mexico (Table 1). Black bear numbers are fairly moderate in forested areas of the western two-thirds of the State. The estimated population for New Mexico is 6,000 as discussed in Section 2.1.1.4. Many consider that estimate to be conservative. But for sake of estimating impacts, this number would be used which equates to a density of 0.33 bears/mi2, about the lowest density estimate for black bears. The sustainable harvest for black bears is 20% of the population (USDA 1997). WS average take from FY98 to FY04 was 4, 3 killed and 1 relocated (Table 6), with a high of 12 killed in FY02 or 0.2% of the population. The highest cumulative take occurred in FY03 with 743 or 12.4% of the population, about 65% of the sustainable harvest (Table 14). A cumulative take of 1,200 bears would have to be taken before a sustainable harvest level would be exceeded. Cumulative take could double before a decline in the bear population would be likely to occur.

NMDGF has responsibility for black bears and has decision authority over the take and disposition of black bears damaging resources in New Mexico similar to the situation with cougar management discussed above. WS and NMDGF have a JPA for WS to respond to some of these complaints. Since NMDGF uses commonly accepted methods of monitoring harvest, depredation take, and other mortality such as road kills to determine the impact on the black bear population, they should be able to keep take from all sources at levels sufficient to maintain a viable population in accordance with their management objectives. Black bears in New Mexico are monitored in 6 Hunt Zones (Hunt Zone 1-6) and bears taken by NMDGF action (depredation) are counted against quotas set up for the Hunt Zone. Bear Hunt Zones have two quotas, one for total bears and one for the number of females; if either of the quotas are met, the season is closed within 72 hours thereafter. Hunters must present the hide for pelt tagging within 5 days of the kill; landowners, lessees, or their agents must notify NMDGF within 24 hours of a bear killed for actual or the threat of depredation. WS in Oregon found that the majority (more than 90%) of bear taken for hoofed-livestock predation are males (T. Hall, WS, pers. comm. 2005). WS notifies NMDGF where and when black bears are taken because they are added to the quota of the Hunt Zone. Since NMDGF monitors the bear population closely, they should be able to keep harvest and take within levels sufficient to maintain a viable population in accordance with their management objectives.

Similar to the situation with cougars discussed above, justification for a finding of "no significant impact on the quality of the human environment" with respect to WS's take of black bears in New Mexico is the fact that WS's involvement has no adverse effect on the *status quo* because, if WS was not available, NMDGF would take, or issue permits to take, virtually the same bears that are killed by WS. Also similar to cougar

management, WS's involvement should actually *benefit* the ability of NMDGF to control black bear mortality by encouraging livestock owners to rely on government assistance in resolving depredation problems instead of killing bears themselves. This suggests that, if WS stopped its involvement in black bear management in the State, there would be virtually no change in environmental effects or in cumulative environmental effects other than to perhaps result in worse effects on the black bear population by encouraging more private control actions as allowed under state law.

Table 14. Cumulative black bear kill in New Mexico by WS (target and nontarget) and private harvest for FY01 to FY04.

BLACK BEAR IMPACT ANALYSIS				
	FY01	FY02	FY03	FY04
Est. Population	6,000	6,000	6,000	6,000
WS Take	6	12	3	0
Sportsmen Harvest	480	522	740	455
Total Take	486	534	743	455
WS Take - % of Pop.	0.1%	0.2%	0.1%	0.0%
Total Take - % of Pop. population	8.1%	8.9%	12.4%	7.6%
Sustainable Harvest Level	20%	20%	20%	20%

Feral Cat Impact Analysis. Feral cats are fairly common in New Mexico with an average of 16 requests for assistance annually from FY98 to FY04 (Table 1). However, WS rarely conducts PDM directed at them. WS killed an average of 1 and released 9 feral cats (to Animal Control) annually from FY00 to FY04 in PDM (Table 4 and 6). Cats have been cited as having an impact on several wildlife species (American Bird Conservation 1997). An increase in PDM activities focused on feral cats would increase the level of take, but not to levels that would be significant to the human environment because they are not a native component of the human environment. The effect of feral cat control would likely be positive, especially for species such as birds. Even if the program were expanded to include control of the cats for wildlife, the take of cats by WS would be comparably minor to the number killed by animal control and humane organizations in New Mexico each year. The take of feral cats by the program is considered to be of no significant impact on the human environment since cats are not an indigenous component of ecosystems in New Mexico.

Feral Dog Impact Analysis. Feral and free-roaming dogs are common in New Mexico. In response to an average of 14 damage occurrences annually involving dogs (Table 1), WS took an average of 4 target feral dogs (2 killed and 2 turned over to Animal Control agencies). These requests come from various entities, but can be targeted according to New Mexico State law. WS also took an annual average of 33 feral dogs incidental to PDM were taken by WS, 25 killed and 8 released, from FY98 to FY04 (Table 4 and 6). However, take of feral or free-ranging dogs by WS is considered to be of no significant impact on the human environment since dogs are not an indigenous component of ecosystems in New Mexico. In addition, the kill of dogs by WS is minor in comparison to the millions killed by animal control and humane organizations in the country and New Mexico each year. Therefore, no analysis of population impacts are given.

Raccoon Population Impact Analysis. WS has received about 12 requests annually from FY98 to FY04 for raccoons (Table 1). The raccoon population in New Mexico has grown steadily because people create habitat for them allowing them to increase, especially in urban areas. A conservative estimate would be 32,000 (Section 2.1.1.8). In response to raccoon damage, WS took an average of 15 raccoons annually (8 killed and

7 relocated) from FY98 to FY04 (Table 6); additionally, WS took an average of 6 nontarget raccoons, 4 killed and 2 freed (Table 4). Sportsmen took an average of 243 raccoons between the 2000-01 and 2003-04 hunting seasons annually (Table 7). WS's maximum take from FY01 to FY04 was 14 in FY01, less than 0.1% of the population; the highest cumulative take occurred in FY01 with 444 or 1.4% of the population, less than a thirtieth the sustainable harvest (Table 15). The sustainable harvest level for raccoons was established at 49% of the total population (USDA 1997). WS take and cumulative impact is of low magnitude to the raccoon population.

Table 15. Cumulative raccoon kill in New Mexico by WS (target and nontarget) and private harvest for FY01 to FY04.

RACCOON IMPACT ANALYSIS				
	FY01	FY02	FY03	FY04
Est. Population	32,000	32,000	32,000	32,000
WS Take	14	11	2	2
Sportsmen Harvest	430	191	192	157
Total Take	444	202	194	159
WS Take - % of Pop.	0.0%	0.0%	0.0%	0.0%
Total Take - % of Pop. population	1.4%	0.6%	0.6%	0.5%
Sustainable Harvest Level	49%	49%	49%	49%

Fox Populations Impact Analyses. Of the four fox species, WS receives the majority of requests for assistance for gray fox and red fox, 3 and 2 annually, from FY98 to FY04 (Table 1). WS rarely receives complaints for the 2 other species; WS only received 3 complaints for kit fox in FY98 and none for swift fox from FY98 to FY04 (Table 1). WS took an average of 7 target gray fox with 6 killed and 1 relocated and killed 2 target red fox in New Mexico from FY98 to FY04 (Table 6). No kit or swift fox were taken as targets. WS did kill an average of 35 gray fox, 1 red fox, 23 kit fox, and 15 swift fox as nontargets annually from FY98 to FY04 (Table 4). NMDGF reported an average of 833 gray, 39 red fox, 39 kit fox, and 34 swift fox taken by sportsmen in the 2000-01 to 2003-04 seasons (Table 7). A sustainable harvest for gray fox is 25% and for red fox 70% of the total population(USDA 1997) or 10,000 and 4,900 per year of the estimated populations of 40,000 and 7,000 (Section 2.1.1.9). A sustainable harvest has not been determine for kit or swift fox, but if 25% of the population (same for gray fox) could be taken without an adverse impact on the population, it is perceivable that about 3,500 kit and swift fox could be taken for the estimated populations of almost 14,000 (Section 2.1.1.9). Therefore, WS take of 0.2% at most for these 4 species and cumulative take of less than 5% (Table 16) is clearly of a low magnitude impact and is likely to stay fairly similar in the reasonably foreseeable future.

Table 16. Cumulative fox kill in New Mexico by WS (target and nontarget) and private harvest from sportsmen for FY01 to FY04.

FOX IMPACT ANALYSIS				
	FY01	FY02	FY03	FY04
GRAY FOX				
Est. Population	40,000	40,000	40,000	40,000
WS Take	32	26	91	31
Sportsmen Harvest	574	488	690	1578

FOX IMPACT ANALYSIS				
Total Take	606	514	781	1,609
WS Take - % of Pop.	0.1%	0.1%	0.2%	0.1%
Total Take - % of Pop. population	1.5%	1.3%	2.0%	4.0%
Sustainable Harvest Level	25%	25%	25%	25%
RED FOX				
Est. Population	7,000	7,000	7,000	7,000
WS Take	14	11	2	2
Sportsmen Harvest	15	22	20	98
Total Take	29	33	22	100
WS Take - % of Pop.	0.2%	0.2%	0.0%	0.0%
Total Take - % of Pop.	0.4%	0.5%	0.3%	1.4%
Sustainable Harvest Level	70%	70%	70%	70%
KIT FOX				
Est. Population	13,800	13,800	13,800	13,800
WS Take	18	26	14	23
Sportsmen Harvest	18	36	6	97
Total Take	36	62	20	120
WS Take - % of Pop.	0.1%	0.2%	0.1%	0.2%
Total Take - % of Pop.	0.3%	0.4%	0.1%	0.9%
Sustainable Harvest Level	25%	25%	25%	25%
SWIFT FOX				
Est. Population	13,900	13,900	13,900	13,900
WS Take	14	11	2	2
Sportsmen Harvest	430	191	192	157
Total Take	444	202	194	159
WS Take - % of Pop.	0.1%	0.1%	0.0%	0.0%
Total Take - % of Pop.	3.2%	1.5%	1.4%	1.1%
Sustainable Harvest Level	25%	25%	25%	25%

Badger Population Impact Analysis. WS received an average of 4 requests for assistance annually for badgers (Table 1) and took 2 targets annually from FY98 to FY04 (Table 6). Additionally, WS took an average of 19, 11 killed and 8 freed, as nontargets incidental to PDM activities from FY98 to FY04 (Table 4). An average of 90 have been harvested by sportsmen from the 2000-01 to 2003-04 seasons (Table 7). The harvest by sportsmen in the 1981-82 season was higher than cumulative take in any year at 585 representing 1.4% of the estimated population of 41,000 in New Mexico (Section 2.1.1.10). This suggests that cumulative take could increase substantially before an impact on the badger population would be seen and that WS take has been of low a very low magnitude on the badger population.

Ringtail Population Impact Analysis. WS received an average of 1 request for assistance annually for ringtails (Table 1). WS did not kill any target ringtails from FY98 to FY04, but did relocate 2 in the 7 years (Table 6). None were taken from FY98 to FY04 as nontargets (Table 4). Sportsmen harvested an average of 53 annually from the 2000-01 to 2003-04 seasons; 774 were harvested in the 1981-82 season suggesting a much higher harvest is sustainable (Table 7). The estimated population of ringtail is 18,100 (Section 2.1.1.11). A sustainable harvest rate has not been determined for ringtail, though it is likely as high as it is

for the small foxes or 25%; this would equate to about 4,500 ringtail. The ringtail population has had no impact on them through PDM and sportsmen from FY01 to FY04 with the highest take at 0.6% of the population. The 1981-82 harvest would have been 4% of the estimated population. WS concludes that WS and cumulative impact has had only a low level impact on the ringtail population and would have to be in thousands before a moderate level would be reached.

Other Target Predator Species Impacts. The other predator species that may cause occasional problems in New Mexico are opossum, long- and short-tailed weasels, feral domestic ferrets, mink, marten, and coatis, but none have been taken as target or nontargets from FY98 to FY04. WS receives periodic complaints involving these species and may conduct operational PDM in the future to take offending animals. Of these species, WS received 1 complaint annually for opossums and just 1 complaint for a feral domestic ferret from FY98 to FY04 (Table 1); no complaints were received for any of the other species. Population estimates are given for these species in Section 2.1.1 and as noted some are rare in the state because of limited distribution. However, even with minimal take by WS, these populations are highly unlikely to be cumulatively impacted by WS PDM efforts. Therefore, unless a major project takes place that involves the take of a large number of one of these species (more than 50), WS would not analyze population impacts.

4.2.1.2 Alternative 2 - No Federal WS PDM. Under this alternative, WS nor any other federal agency would provide assistance with PDM and, therefore would not have any effect on target predator populations in New Mexico. The primary concern of not having a federal program is that impacts would increase because non-professional private individuals efforts conducting PDM on their own would likely increase. Many of these individuals would probably be untrained and unlicenced to use certain PDM methods that have the potential for high impacts when not properly used. Because private persons conducting PDM would not be associated with a federal program, accountability, records maintenance, regulatory and policy compliance, and coordination with other agencies would not always be required or adhered to, thus, impacts would have the potential to be much higher than under the Current Program Alternative. However, New Mexico State agencies such as NMDGF and NMDA, and private organizations conducting PDM could increase in proportion to the reduction of federal services; that portion of WS currently under NMDA would probably still provide some level of PDM, but without federal supervision. NMDGF would still have to respond damage caused by classified and protected wildlife and would not be able to get support from WS. These efforts, and efforts by agencies and organizations to reduce or prevent depredations would probably result in about he similar effects as those of the proposed action depending on the level of effort expended by the State and by private persons and organizations. For the same reasons shown in the population impacts analysis, section 4.2.1.1, it is highly unlikely that predator populations would be affected by implementation of this alternative. However, the hypothetically use of illegal chemical toxicants caused by frustration as described in 4.2.2 could lead to unknown, but potentially significant, impacts on carnivore populations. Additionally, if no agency, groups, or individuals were able to respond to damage complaints, much of the public could become intolerant of wildlife as a whole (International Association of Fish and Wildlife Agencies 2004).

4.2.1.3 Alternative 3 - Technical Assistance Only. Under this alternative, WS would only provide advice or guidance on PDM techniques and methods, but would not conduct any direct operational PDM in attempting to resolve damage complaints, and therefore, would not have any impact on predators in New Mexico. As discussed under the No Federal Program Alternative, similar PDM would likely be conducted by private individuals, State agencies and organizations in proportion to federal services lost. It is unlikely,

though, that impacts on target predator species populations would be seen because they are all fairly healthy. Similar negative impacts as seen under Alternative 2 would likely occur such as the illegal use of chemicals and the public's intolerance towards wildlife.

4.2.1.4 Alternative 4 - Nonlethal Required before Lethal Control. This alternative would require that resource owners use nonlethal techniques prior to WS implementing lethal PDM methods to resolve a damage problem. This alternative would affect WS's ability to quickly address predator threats and damage problems by limiting control actions to nonlethal PDM methods before lethal measures could be used. Under this alternative, agricultural and property resource damage would be greater than under the Current Program Alternative due to the restrictions placed on this management alternative. Since nonlethal PDM strategies alone do not always prevent or reduce wildlife damage to acceptable levels, other government agencies, private organizations, and individuals would likely assume responsibility for implementing lethal controls necessary to adequately deal with these problems. WS would have a lesser impact on target predator species populations under this alternative, primarily because others would initiate lethal control prior to WS being able to. However, impacts would likely be very similar to the current take. WS by policy already uses nonlethal methods first as appropriate; for example, using the WS Decision Model (Slate et al. 1992), a WS Specialist may determine that lethal PDM is necessary to abate a current problem, but he would provide the landowner information on nonlethal techniques to reduce the likelihood of it recurring again. For the same reasons shown in the population impacts analysis in section 4.2.1.1, it is highly unlikely that coyote populations or other predators would be affected by implementation of this alternative. Impacts and possible risks of illegal chemical toxicant use under this alternative would probably be somewhere between Alternatives 1 and 2.

4.2.1.5 Alternative 5 - Corrective Control Only When Lethal PDM Methods are Used. Under this alternative, WS take of target predator species would probably be somewhat less than that of the proposed action because lethal actions by WS would be restricted to situations where damage had already occurred. Where damage had not occurred, the requestor or, possibly, WS could use only nonlethal PDM methods. For many individual damage situations, this alternative would be similar to the current program because many producers do not contact WS until damage has already occurred or nonlethal methods are already being attempted by the landowners. In addition, WS often does not conduct proactive control for many of the predator species because of the relatively low occurrence of damage. WS conducts preventive control for species such as coyotes and red fox where the area has had historic damage. Without WS conducting proactive control activities, it is likely that private efforts at proactive control would increase. These increased private PDM activities would lead to potentially similar cumulative impacts as those described under the no program, Alternative 2. For the same reasons shown in the population impacts analysis in section 4.2.1.1, it is highly unlikely that the coyote or other predator populations would be affected by implementation of this alternative. Impacts and hypothetical risks from illegal chemical toxicant use under this alternative would probably be the same as those under Alternatives 2 and 3, but at a much reduced occurrence. Any reductions in targeted wildlife by WS as a result of this alternative would have no major adverse impacts to the species involved or New Mexico's statewide population. Therefore, the effects on target species populations would probably be insignificant, similar to that described under the Current Program Alternative.

Preventive control is used most often in cattle and sheep production areas that have had historical damage, primarily from coyotes. Most sheep and cattle producers already use one or more nonlethal PDM methods.

Connolly and Wagner (1998) found that 55% of the U.S. sheep producers, that own 70% of the nations' sheep, used one or more nonlethal PDM measures in 1994. Fencing, husbandry, guard animals, and frightening tactics were the most common nonlethal PDM methods used during the survey. Wagner and Conover (1997) concluded that the need of traps, snares, and M-44's for corrective control was lower on sites with preventive aerial hunting than sites without preventive aerial hunting. Foothold traps, snares and M-44s have a greater risk of capturing a nontarget species than aerial hunting. Therefore, risks to non-target species would probably be slightly increased under this alternative. WS would likely be less effective at reducing coyote predation on summer sheep grazing areas without the option of winter-time aerial hunting. In a study by Wagner and Conover (1997), sheep and lamb losses were lower on sites with preventive aerial hunting than on similar sites without preventive aerial hunting. Decreased effectiveness is related to the logistics of just getting to these areas and having to use less effective coyote removal methods, during the summer months. Gantz (1990) noted that the coyotes most likely to kill sheep are the ones raising pups (Till and Knowlton 1983), and that late winter aerial hunting of coyotes on summer sheep grazing allotments removes coyotes that otherwise likely would have produced pups. By conducting preventive control in late winter, the likelihood of transient coyotes occupying vacated territories and establishing their own territories in time to produce pups is greatly reduced. Gantz (1990) concluded that late winter aerial hunting of coyotes on summer sheep range was an effective method to reduce coyote predation. By restricting corrective PDM to the immediate vicinity of predation losses, WS would be unable to effectively resolve some depredation problems. Till (1992), for instance, found that depredating coyotes traveled an average of 2 miles and as far as 6 miles from their den site to the sheep flocks where they were killing lambs.

4.2.2 Effects on Nontarget Species Populations, Including T&E Species

Nontarget species can be impacted by PDM wether implemented by WS, other agencies, or the public. Impacts range from direct take from implementing PDM methods to indirect impacts to other wildlife resulting from the reduction of predators in a given area. SOPs are often incorporated into PDM to reduce impacts where possible. Because these various factors may at times preclude use of certain methods, it is important to maintain the widest possible selection of PDM methods to most effectively resolve damage problems. However, the PDM methods used to resolve predator damage must be legal and biologically sound. Often, but not always, impacts can be minimized. Where impacts occur, they are mostly insignificant in terms of nontarget species populations. Following is a discussion of the various impacts under the Alternatives.

4.2.2.1 Alternative 1 - Continue the Current Federal PDM Program. New Mexico WS takes nontarget species while conducting PDM, about 3% of the total take of all animals killed by WS in PDM over the last 7 FYs. As the PDM methods have improved, the incidence of nontarget take has decreased. The nontarget species taken from FY98 to FY04 (Table 4) included 27 species, 15 predators covered in this EA and 12 other species. This gives a good indication of the selectiveness of the PDM methods used. SOPs to minimize nontarget impacts were described in section 3.4.2.2. These SOPs have insured that nontarget take in New Mexico remains at relatively low levels. The percentage of nontarget species killed in comparison to the total number of animals killed in PDM activities has dropped from almost 5% in FY98 to about 2% in FY04 (Figure 5); this drop reflects the higher selectivity of the PDM methods in use (e.g., traps have underpan-tension devices to preclude capture of many species).

Nontarget species taken in New Mexico were recorded as unintentional targets and nontargets. Unintentional

targets are listed on the agreement as target species but are taken unintentionally during efforts to take other target species. Nontargets are not listed as target species on the agreement and are taken unintentionally during efforts to take target species. The effects on nontarget species would be similar to those described in previous EAs (WS 1997a, b, c), except that nontarget take has been reduced over the past several years because of the increased selectiveness of PDM methods being used. The only difference under this new statewide EA would be that WS Specialists would have a more consistent selection of PDM techniques to use since policies for their use would be more consistent across land boundaries.

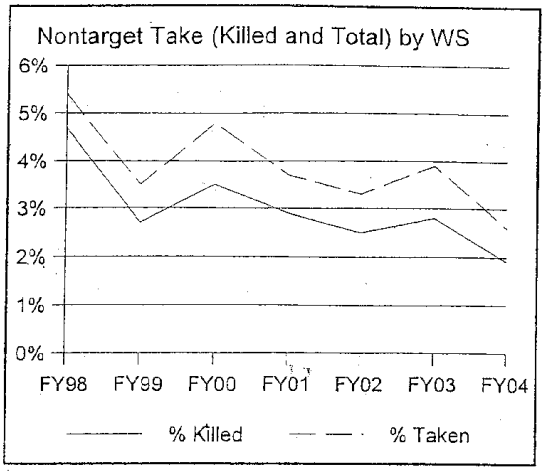

Figure 5. The percentage of killed and freed nontarget species compared to their respective totals of all animals taken in PDM by WS in New Mexico from FY98 to FY04.

Unintentional target and nontarget predators killed by WS during PDM activities from FY98 to FY04 included an average of 44 skunks, 35 gray fox, 25 feral dogs, 23 kit fox, 15 swift fox, 11 badgers, 5 bobcats, 4 raccoons, 1 coyote, 1 cougar, 1 black bear, 1 red fox, and less than 1 feral cat, hog-nosed skunk, and spotted skunk. Other nontarget species included an average of 21 porcupines, 3 black-tailed jackrabbits, 3 mule deer, 2 common ravens, 1 American crow (*Corvus brachyrhynchos*), 1 antelope, and less than one (no more than 3 in 7 years) javelina (*Pecari angulatus*), feral hog, ground squirrel, Norway rat (*Rattus norvegicus*), and scrub jay (*Aphelocoma coerulescens*). Nontarget take was analyzed in the population impacts analysis under 4.2.1.1 for the predators taken by WS in PDM; it was found that WS PDM has a low magnitude impact on any of these species. In fact, evidence exists that small carnivore abundance typically increases in areas where coyote populations have been reduced (Robinson 1961, Nunley 1977). Thus, current PDM activities in New Mexico are more likely to be beneficial to these smaller predators. Porcupines had the highest take for a nontarget species other than a predator. The highest take of porcupines was in FY98 when 50 were killed; for comparison, sportsmen harvested 4,625 in Colorado in 1989 which is an indication of their abundance in similar habitat (Colorado Division of Wildlife *unpubl data*). As far as the other species taken in the last 7 FYs, no analysis for black-tailed jackrabbit, mule deer, common raven or other population impacts is presented here because these species are common in New Mexico and the minimal nontarget take by WS PDM is low enough to be intuitively insignificant to populations. WS concludes that it has not had an impact on nontarget species in New Mexico.

Other potential species that could be taken as nontargets in New Mexico are also abundant enough that their populations would not be significantly affected, with the exception of the T&E species, and Canada lynx and condors straying from reintroduction sites in Colorado and Arizona, respectively, discussed below.

Consideration of Impacts to T&E Species in New Mexico. Measures to avoid T&E impacts were described or referenced in section 3.4.2.2. Those measures should assure that the proposed action would minimize impacts on T&E species. Of the Federal and State listed species occurring in New Mexico, it was determined (Section 2.1.2.2) that PDM could adversely affect only the terrestrial vertebrate species (5 mammals, 3 birds, and 2 reptiles). Table 5 in Chapter 2 identified the species that could potentially be impacted by PDM; 10 species could be negatively affected by PDM and 8 T&E species could be positively affected.

T&E Species with the Potential for Adverse Impacts from PDM

USFWS and NMDGF monitor several species considered threatened, endangered or sensitive in New Mexico. They monitor these species populations to determine if different activities singly or combined are impacting their populations (a cumulative impact analysis). Mortality for T&E species is monitored where feasible by these agencies, but many activities in New Mexico including road kills, land development, construction, natural disasters, and so forth are the same under all alternatives (*environmental status quo*); much of this mortality is difficult to determine, and thus, can only be generalized by how well a population is doing (increasing, decreasing, stable). The availability of habitat is often the most critical concern because the available habitat determines what population an area can support. WS consults with these agencies, as necessary, to provide them with information regarding WS's potential to take these species with PDM methods. WS has determined that one or more PDM activities have the potential to adversely affect 10 T&E species (not including the lynx or condor) and pose jeopardy, but are not likely to result in jeopardy following reasonable and prudent alternatives or measures initiated to minimize impacts. Most of the Federally listed species have already been discussed in the BO issued by USFWS in 1992 (USDA 1997) or other BOs issued afterwards (USFWS 1997, 1998a, 1999 a, b). Details can be found in those documents for all of the following *may affect* species. In the formal consultation, reasonable and prudent alternatives or measures were addressed along with an incidental take statement, where appropriate, with their terms and conditions. WS abides by these and have not impacted any federally listed T&E species in New Mexico conducting PDM since this was written.

The USFWS 1992 BO on the national WS program listed the black-footed ferret, gray wolf, bald eagle, Attwater's greater prairie-chicken (listed because similar to lesser prairie-chicken), and California condor as likely to be adversely affected by some aspect of the WS PDM program (USDA 1997). An analysis of the potential effects on these species may be found in Appendix F of USDA (1997). WS also consulted further on methods for the ridge-nosed rattlesnake and bald eagle (USFWS 1997), and on new listings for the Mexican gray wolf (USFWS 1998a), and jaguar (USFWS 1999 a, b). WS is currently undergoing a new nationwide consultation with USFWS because several species have been added and others delisted since that consultation. A species added since the 1992 USFWS BO is the Canada lynx in Colorado; New Mexico was not determined to be in its historic range and not considered in the listing by USFWS because no records for the species exists in New Mexico. Additionally, the 1992 USFWS BO listed the whooping crane (no longer in New Mexico) as likely to be adversely affected, but not by WS PDM, and Eskimo curlew, least tern and piping plover as not likely to be adversely affected by WS PDM. Following is information regarding the species that could be affected.

Black-footed Ferret. It is doubtful, though remotely plausible, that a wild population exists in New Mexico today since none have been verified since 1934. Currently, non-essential/experimental populations have been reestablished in several states, but none in New Mexico. This activity is helping recover the ferret as their wild population is growing. The 1992 USFWS BO stated that leghold traps and gas cartridges used in PDM had the potential for taking ferrets (the label for the M-44 does not allow its use in prairie dog towns to preclude exposure to ferrets and thus has no effect on the ferret). However, WS uses pan-tension devices on leghold traps to preclude capture of the ferrets when working in or near prairie dog colonies. Gas cartridges are only used as allowed

under the Reasonable and Prudent Alternatives of the USFWS BO (USDA 1997). WS has not taken any black-footed ferrets in New Mexico, and does not anticipate such. The BO did not allow for incidental take of this species; thus, it is expected that WS would have no impact on any ferrets. However, none have been known to be taken in New Mexico for more than 70 years.

Marten. Marten populations exist in a few areas of New Mexico. None have been taken by WS in New Mexico as a nontarget (or target) for at least the last 10 FYs. PDM devices that could potentially take a marten are M-44s, leghold traps, and small snares. None have ever been taken with an M-44 nationally, but it could be a potential because they are a scavenger. WS uses pan-tension devices on leg-hold traps which precludes take with this device. WS does not use snares for small predators such as fox in marten habitat, thus none would be taken. WS has not cumulatively added to any known recent take. WS would avoid using methods that could impact the marten in their habitat, as possible.

Mexican Gray Wolf. The gray wolf, including the Mexican subspecies, was extirpated from much of the lower 48 continental United States in the first half of the twentieth century. The Mexican wolf population once inhabited areas in Arizona, New Mexico, Texas, and Mexico, but they were probably extirpated from the U.S. by 1970 with the last verified report of a wild wolf; and may altogether be extirpated now in Mexico. Fortunately, captive Mexican wolves were available for their recovery. They now have been reintroduced in Arizona and New Mexico as a "Nonessential/experimental population" under section 10(j) of the Endangered Species Act which is outlined in the Wolf Recovery Plan.

Many tools used in WDM for large predators such as leghold traps, snares, M-44s, and aerial hunting have the potential of taking a wolf. WS follows the conservation measures established in the 1998 BO and Conference Opinion issued by USFWS (1998a) ; this was actually two opinions - a "BO" for "naturally occurring wolves" and a "Conference Opinion" for the reintroduced nonessential/experimental wolves. WS abides by both which provided conservation recommendations for WDM method use while working in the "occupied wolf range" for the "naturally occurring" and nonessential/experimental wolf populations. In the event that WS personnel sight a wolf or find evidence that indicates their likely presence in an area, such as scat and tracks, or WS is made aware of verified sightings, WS would initiate the same conservation measures as is conducted within the nonessential/experimental population zone area. Within the immediate area where wolves or verified sign has been found and documented by WS personnel, M-44s and neck snares would not be used, and padded-jaw leghold traps and leg-snares would be checked on a daily schedule. WS personnel would be made aware of the presence of wolves, and shooting, including aerial hunting activities, would be minimized and limited to those personnel that have been trained to recognize the difference between wolves and coyotes. In addition, the USFWS Wolf Recovery Team would be notified of the presence of a wolf. WS may assist the Wolf Recovery Team in trapping the wolf so that it can be examined. The use of immobilizing drugs to capture a wolf would only be conducted by WS personnel certified in their use. If the captured wolf is truly a wild individual from the nonessential/experimental population, it would be returned to the nonessential/experimental population range. If it were truly a "wild" wolf, it would be released or turned over to the Wolf Recovery Team. However, if it was determined to be a released wolf-dog hybrid, it would be turned over to a local Animal Control Office, Sheriff or euthanized, as

appropriate.

In the event that a wolf has been found to kill livestock in New Mexico, WS would verify and document the predation, obtain pertinent evidence such as photographs, and contact the USFWS Wolf Recovery Team. Should the Recovery Team determine that the offending individual(s) need to be captured, the Recovery Team may request WS to initiate WDM activities to control the damages caused by the wolf.

It is WS's findings that WDM activities may affect wolves. However, PDM methods are not likely to jeopardize wolf recovery, especially considering that wolves would most likely be from a nonessential/experimental population, and WS would initiate measures identified to reduce the likelihood of take to avoid jeopardy should a wolf be found outside of its nonessential/experimental population range in New Mexico. The 1998 BO and Conference Opinion issued incidental take statements for the take of naturally occurring and reintroduced populations of wolves, but did not anticipate that any would be taken. WS in New Mexico abides by the 1998 BO and Conference Opinions (USFWS 1998a) and, therefore, does not request further consultation for this species at this time.

Jaguar. The jaguar was not part of the 1992 BO (USDA 1997) because it was not listed until 1994. However, WS initiated consultation and USFWS issued a BO and amendment in 1999 (USFWS 1999 a, b). USFWS issued a *may effect, but not likely to jeopardize* with reasonable and prudent alternatives and measures opinion. WS in New Mexico abides by the reasonable and prudent alternatives and measures established in it. USFWS also issued an incidental take statement in the opinion. Direct take for depredating jaguars, though, would be covered under a separate permit and consultation with USFWS. WS has not had any effect on the jaguar since and has not documented any sightings where PDM has been conducted in Hidalgo County since 1994 and continues to work closely with USFWS. WS in New Mexico abides by the BO (USFWS 1999a, b) and, therefore, does not anticipate take nor add to any cumulative effect on their population.

White-sided Jackrabbit. The leghold trap and potentially snares are the primary PDM methods that could take these jackrabbits. WS uses pan-tension devices and only large snares where they occur precluding capture. WS has not taken any white-sided jackrabbits in the last 10 FYs, and does not anticipate any take and, therefore, would not impact their population

Bald Eagle. The risk of lead poisoning, caused by eagles ingesting lead in predator carcasses killed by shooting, was discussed with the USFWS. WS in New Mexico uses nontoxic and copper plated lead shot in all aerial hunting operations which minimize any likelihood of poisoning bald eagles (discussed further below). Carcasses of predators killed with high-powered rifles normally do not retain the lead bullet. Measures are used for PDM methods that could adversely affect bald eagles such as leghold traps being placed at least 30 feet from carcasses because the carcass could lure them to the site. Based on an evaluation and discussion with the USFWS and NMDGF, WS has concluded that implementation of the proposed action would not likely affect the bald eagle. WS in New Mexico has not taken a bald eagle, but acknowledges that the potential exists, and therefore, would minimize these risks by abiding by the SOPs and measures implemented to reduce take given in Section 3.4.2.2. Bald eagle populations are increasing across their range indicating that the

population has been recovering and that mortality from all causes has not exceeded a significant level. WS has not taken any bald eagles in the last 10 FYs, thus WS has not cumulatively added to any known take because none have been taken.

Concern has arisen regarding lead poisoning from bald eagles scavenging predators that have been shot. The WS Program has tried various nontoxic (non-lead) shot loads to reduce the concern of lead poisoning, however there is some evidence that the lead threat is not as severe as previously thought. Hayes (1993) reviewed literature and analyzed the hazard of lead shot to raptors. Key findings of that review were:

- Eagles are known to scavenge on coyote carcasses, particularly when other food sources are scarce or when food demands are increased.

- In studies that documented lead shot consumption by eagles (i.e., based on examining the contents of regurgitated pellets), the shot was associated with waterfowl, upland game bird, or rabbit remains, and was smaller than BB or #4 buckshot used in aerial hunting. Lead levels have been detected in eagle blood samples, but the source of the exposure was unknown. Lead residues have been documented in jackrabbits, voles (*Microtus sp.*), and ground squirrels which can explain how eagles could ingest lead from sources other than lead shot. In one study (Pattee et al. 1981) four of five captive bald eagles force fed uncoated lead shot died and the fifth went blind. Frenzel and Anthony (1989) suggested, however, that eagles usually reduce the amount of time that lead shot stays in their digestive systems by casting most of the shot along with other indigestible material. It appears that healthy eagles usually regurgitate lead shot in pellet castings which reduces the potential for lead to be absorbed into the blood stream (Pattee et al. 1981; Frenzel and Anthony 1989).

- WS personnel examined nine coyotes shot with copper plated BB shot to determine the numbers of shot retained by the carcasses. A total of 59 shot pellets were recovered, averaging 6.5 pellets per coyote. Of the 59 recovered pellets, 84% were amassed just under the surface of the hide opposite the side of the coyote that the shot entered, many exhibited minute cracks of the copper plating, and two shot pellets were split. The fired shot were weighed and compared with unfired shot and were found to have retained 96% of their original weight. Eagles generally peel back the hide from carcasses to consume muscle tissue. Because most shot retained by coyotes tends to end up just under the hide, it would most likely be discarded with the hide. Any shot consumed would most likely still have the nontoxic copper plating largely intact, reducing the exposure of the lead to the digestive system. These factors, combined with the usual behavior of regurgitation of ingested lead shot indicate a low potential for toxic absorption of lead from feeding on coyotes killed by aerial hunting.

- Bald eagle populations appear to be increasing in the contiguous 48 states and have met or exceeded recovery goals in several states. Golden eagle populations appear to be healthy. Breeding Bird Survey Data indicate a general increasing trend in breeding populations of both golden and bald eagles in North America since 1966 (Sauer et al. 2004). Thus, eagle populations do not appear to be significantly adversely affected by toxicity problems.

The above analysis indicates adverse effects on eagles from scavenging on coyotes killed by aerial hunting are unlikely. The USFWS did not identify this as a concern in the 1992 BO (USDA 1997) which covered potential adverse effects on bald eagles from all WS used WDM methods, including shooting. WS would retrieve coyote carcasses where practical and dispose of them in an area where eagles would not be able to scavenge on them. In addition, WS has been testing the use nontoxic Bismuth shot for aerial hunting. WS has contracted with a company to make the shotgun shells suitable for aerial hunting purposes specifically for WS. This would greatly reduce the potential for lead poisoning.

Gould's Wild Turkey. WS rarely works in areas that are inhabited by Gould's wild turkeys, but uses PDM methods appropriately to reduce the potential for take. WS has not taken any in the last 10 FYs and thus has not added to any cumulative impacts on this species.

Lesser Prairie-chicken. WS abides by the Reasonable and Prudent Alternatives that were established, requiring the use of pan-tension devices, for the Attwater's prairie chickens and have not taken any in at least the past 10 FYs, and thus, have not added to cumulative impacts on this species. On the other hand, since the prairie chicken has declined in several areas to precariously low numbers and predators have been found to have at least some effect on them, PDM in their range could have a positive effect. WS has conducted PDM for their protection near leks and nesting areas. USFWS (1998b) found that PDM did help the Attwater's prairie-chicken.

Gila Monster and New Mexico Ridge-nosed Rattlesnake. The only PDM method that could impact these species is the gas cartridge used to fumigate coyote, red fox, and skunk burrows. The fumigation of predator burrows is highly unlikely to have an effect on the Gila monster or rattlesnake because predators do not tolerate other den inhabitants in active dens; WS personnel are capable of determining active den sites. Consultation in 1998 with USFWS on the predator denning cartridge concurred with a *not likely to adversely affect* the ridge-nosed rattlesnake with this method.

Other Species of Concern, Not Listed as T&E in New Mexico

Canada Lynx. Currently, the lynx population in Colorado has been increasing as a result of additional reintroductions from Canada and Alaska, and reproduction, and several have wandered into New Mexico, particularly as a result of recent releases which tend to roam more than lynx that have become established. PDM methods with the high probability of take include leghold traps, snares, M-44s, and trailing dogs. Measures to avoid capture are given in Section 3.4.2.2. WS has not taken a lynx in New Mexico. However, mortality has come in the form of lynx being shot, killed on highways, and other factors and is being monitored closely by the Colorado Division of Wildlife. Thus far, WS has not added to any cumulative mortality and would not likely because WS does not conduct much PDM in lynx-associated habitat and modifies PDM methods as necessary to reduce the likelihood of take. The USFWS has determined that lynx found outside the Distinct Population Segment are lost to the metapopulation and considers take of these as not essential to their population. USFWS did not list New Mexico as part of the range (USDI 2003).

California Condor. PDM tools that may affect California condors include primarily the M-44,

snares, leghold traps, and lead poisoning from ingesting lead pellets/bullets from carcasses of predators taken by shooting. Measures to reduce the potential for take of condors are given in Section 3.4.2.2. WS has not taken a condor nor anticipate such an occurrence, but would abide by the 1992 USFWS BO (USDA 1997) and measures to minimize any potential take if a condor was found in New Mexico. WS has not cumulatively added to any known take because WS has not taken any.

T&E Species that Could Potentially Benefit from PDM

PDM methods used by WS targeting other predators may have the potential to benefit several T&E species that are predated. These species include the black-footed ferret, white-sided jackrabbit, desert bighorn sheep, piping plover, least tern, lesser prairie-chicken, Canada lynx, and California condor. For example, Buskirk et al. (1999) described the two major competition impacts to lynx as exploitation (competition for food) and interference (avoidance). Of several predators examined, coyotes were deemed the species most likely to pose local or regionally significant exploitation impacts to lynx; additionally, coyotes and bobcats were deemed to possibly have important interference competition effects on lynx. Coyotes have greatly expanded their winter range in New Mexico because they can now use snow-packed trails and plowed roads, to gain access into lynx winter habitat areas where deep snows previously hindered their ability to move into and occupy such areas (USDA 2004). The benefits of removing coyotes from Canada lynx habitat may outweigh any potential for negative impacts on the lynx by reducing direct competition for prey, predation of lynx kittens, and avoidance of certain areas by lynx due to the presence of coyotes.

If USFWS and NMDGF decide to reintroduce ferrets in New Mexico, WS would likely work them to reduce predation of ferrets. It has been found that PDM prior to the establishment of a new ferret colony is essential for their survival. In one of the first releases 34 of 39 ferrets released were killed by predators. It was found by USFWS that PDM at a release site, prior to ferrets being reintroduced, helped get their population established. WS nationally has participated in efforts to continue some PDM following their release to ensure that a viable population is established.

WS is currently conducting PDM nationally to protect several species including the Attwater's (USFWS 1998b) and lesser prairie-chickens. Since the prairie-chicken has declined in several areas to precariously low numbers and predators have been found to have at least some impact on them, PDM in their range can have a positive effect by keeping their numbers at higher levels. When WS conducts PDM where lesser prairie-chickens are found, WS avoids working within a quarter mile of known leks while they are congregating in the mornings during the breeding season to prevent disturbance. USFWS (1998b) conducted an informal intraservice consultation and found that PDM for the protection of the Attwater's prairie chicken would have a beneficial impact and no adverse affects. Several of these T&E species projects have been ongoing for several years, a testimony to their success.

NMDGF may decide to reintroduce the extirpated sage grouse back into New Mexico. It is likely that PDM would be conducted prior to their release. Additionally, PDM may continue following their reintroduction. The new Western Association of Fish and Wildlife Agencies Sage Grouse Management Guidelines suggest that PDM for protection of sage grouse should be implemented only

if nest success is less than 25% or survival of adult hens is less than 45%. Although the Western Association of Fish and Wildlife Agencies sage grouse management guidelines (Connelly et al. 2000) address the issue of nesting success and adult hen survival in relation to the need for PDM, they do not address the appropriateness of PDM when there is low chick survival. There has been very little information available on this subject until recently. Results of studies conducted in 1999 and 2000 in Idaho suggested that survival rates for sage grouse chicks were only 15% and 18%, respectively, and that predators were responsible for 90-100% of the mortality (Burkepile et al. 2001). Although most sage grouse management plans suggest indirect management of grouse-predator relationships through manipulation of habitats, Schroeder and Baydack (2001) have suggested that managers should consider PDM as a management option and evaluate its viability through experimentation.

NMDGF has designated cougar areas in New Mexico where cougars can be removed yearround for the protection of desert bighorn sheep. These actions are anticipated to benefit the bighorn sheep populations. If it is determined that predation is a limiting factor, NMDGF could request WS to conduct predator management until the population shows an increasing annual trend. If PDM does not result in an increasing annual trend, then other limiting factors would be examined. Cougar damage management has been conducted for the federally listed Sierra Nevada bighorn sheep in California and the action was analyzed in an EA (USFWS 1999c). Several biologists believe that cougars may need to be controlled to protect bighorn sheep because cougars limit the population numbers of bighorn (Kamler et al. 2002).

Impacts on Wildlife Species Populations Caused by Low-level Flights during Aerial Hunting. A concern sometimes expressed is that aerial hunting might disturb other wildlife species populations to the point that their survival and reproduction might be adversely affected (discussed in Section 2.1.2.3). Deer, pronghorn antelope, and other wildlife are occasionally seen during aerial hunting operations. However, WS avoids nontarget wildlife seen during aerial operations and presents little disturbance to them. Aerial hunting is an important method of taking primarily target coyotes in New Mexico, especially in the spring when the majority of lambing and calving takes place. WS can use aerial hunting to control coyotes and red fox for the protection of wildlife, under a permit from NMDA for the protection of livestock, and feral dogs pursuant to the Fish and Wildlife Act (section 742j-1). Fixed-wing aircraft are the primary tool used for aerial hunting in New Mexico (about 80% of aerial hunting hours), but a limited use of helicopters is employed in locations where the terrain is rough, heavily wooded, or mountainous. NMDGF uses low-level fixed-wing airplane and helicopter flights routinely to census big game populations.

From FY00 to FY04, WS flew an average of 523 hours annually, 112 hours of helicopter and 411 hours of fixed-wing airplane, over about 7,221 mi^2 of New Mexico (about 6% of the area). WS conducted PDM activities on areas only under agreement. Of the hours, WS flew 80% on private lands, 19% on BLM lands, 1% on USFS lands, and none on other lands. Though WS concentrates flying efforts during certain times of the year to specific areas such as lambing grounds, this basically represents little time annually flown over properties under agreement. The average time spent on lands under agreement is 4 min/mi^2. Therefore, WS would have minimal impact on wildlife from low-level flying.

A number of studies have looked at responses of various wildlife species to aircraft overflights. The National Park Service (1995) reviewed studies on the effects of aircraft overflights on wildlife. The report revealed

that a number of studies have documented responses by certain wildlife species that suggest adverse impacts could occur. Few, if any studies, have proven that aircraft overflights cause significant adverse impacts on populations, although the report stated it is possible to draw the conclusion that impacts to wildlife populations are occurring. It appears that some species will frequently or at least occasionally show adverse responses to even minor overflight occurrences. In general, it appears that the more serious potential impacts occur when overflights are frequent such as hourly and over long periods of time which represents "chronic exposure." Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. WS aerial hunting operations occur in relatively remote rangeland areas where tree cover is at most scattered to allow for visibility of target animals from the air. In addition, WS spends relatively little time over any one area.

Several examples of wildlife species that have been studied with regard to low-level flights are discussed in Section 2.1.2.3 on aircraft overflights which discuss the minimal effects of overflights on several species of wildlife, even those with much exposure. WS believes that low-level flying in New Mexico has not impacted wildlife especially considering the fact that most time aerial hunting is with a fixed-wing aircraft and only 4 minutes are spent over each square mile. Where an animal is disrupted, it would only be temporary and short-lived. WS does not represent chronic exposure to wildlife such as at an airbase or airport, and most studies have revealed that aircraft do not always produce negative responses. Therefore, WS concludes that nontargets under the current program are not affected by aerial over-flights.

4.2.2.2 Alternative 2 - No Federal WS PDM. Under this alternative, WS nor any other federal agency would provide assistance with PDM and, therefore, WS would not have an effect on nontarget or T&E species, or impact wildlife populations with low-level flying. USDA (1997) showed that under the No Federal WS PDM Alternative, more nontarget animals would be affected. NMDGF would still provide some level of professional direct assistance with PDM as directed by State law and would continue to take minimal numbers of nontarget animals, proportionate to the decreased efforts. However, private efforts to reduce or prevent depredations would likely increase which may result in less experienced persons implementing PDM methods leading to a greater take of nontarget wildlife, potentially including T&E species, than under the other alternatives because the least support with PDM would be available. Similar to WS PDM, private individuals could take coyotes and other predators year-round causing damage as appropriate. The number of private landowners using PDM methods would increase and the number requesting NMDGF to resolve the problems would increase requiring more time and effort on the part of NMDGF personnel. Private individuals would not be restricted to WS's SOPs such as WS's self-imposed restrictions (ie. setting traps closer than 30 feet to livestock carcasses to avoid capturing scavenging birds or using pan-tension devices to exclude smaller animals). Therefore, hazards to raptors, including bald eagles, and other nontargets could be greater under this alternative. As described in 2.2.3, the hypothetical use of chemical toxicants could impact nontarget species populations, including T&E species. Therefore, it is likely that much more impacts to nontargets would occur under this alternative than the current program as discussed in section 4.2.1.2.

Impacts to T&E and other sensitive species would be the greatest under this alternative. The SOPs and use of measures to reduce the potential for take by WS and the professional use of PDM methods ensures minimal impacts on T&E species, but this would be foregone where private landowners conducted PDM themselves without assistance from WS. Every species that could be negatively affected by PDM, as given in Table 5, would have a much greater opportunity to be taken under this alternative. Private landowners do not have to be as accountable which could result in greater take. For example, 2 lynx have been killed in

New Mexico as a result of landowners protecting their livestock.

Aerial hunting, though, would probably not be used as much under this alternative because it requires a permit from NMDGF and pilots experienced at low-level flying. Even if NMDGF issued several more aerial hunting permits, the effects of low-level flights on wildlife would likely be similar to those discussed in section 4.2.1.2, barring illegal activities.

4.2.2.3 Alternative 3 - Technical Assistance Only. Alternative 3 would not allow WS to conduct direct operational PDM. Therefore, WS would not have any direct impact on nontarget or T&E species. WS would not conduct aerial hunting and would not have an impact on wildlife with aerial hunting overflights. Although technical support might lead to more selective use of PDM methods by private parties than that which could occur under Alternative 2, private efforts to reduce or prevent depredations could result in less experienced persons implementing PDM methods leading to greater take of nontarget wildlife and T&E species as discussed in section 4.2.2.2. This alternative would have the potential for increased adverse impacts resulting from WS not providing professional PDM and the compensatory actions of private individuals. Presumably, many service recipients would become frustrated with WS's failure to resolve their wildlife damage, and would turn somewhere else for assistance. Higher variability in the level and scope of PDM activities could occur without a full IWDM program, and this could have a greater negative effect on some local wildlife species, including T&E species. Aerial hunting activities would not be used by WS, but could be by the private sector, NMDGF, or NMDA. Even if NMDGF issued several more aerial hunting permits, the effects of low level flights from aerial hunting on wildlife would likely be similar, but less, to those discussed in section 4.2.1.2, barring illegal activities; pilots with less training in low-level flying and potential for illegal activities would likely be higher. The hypothetically use of illegal chemical toxicants caused by frustration as described in 2.2.3 could lead to unknown, but potentially significant, impacts on wildlife populations. Additionally, if no agency, groups, or individuals were able to respond to damage complaints, much of the public could become intolerant of wildlife as a whole which could negatively affect the pubic's perception of projects such as the recovery of a T&E species (International Association of Fish and Wildlife Agencies 2004).

4.2.2.4 Alternative 4 - Nonlethal Required before Lethal Control. This alternative would require that resource owners use nonlethal techniques prior to WS implementing lethal PDM methods to resolve a damage problem. The Nonlethal before Lethal Control Alternative would not consistently allow WS to respond to wildlife threats quickly or adequately. If cooperators were not satisfied by corrective control operations by WS, private efforts to prevent depredations from occurring could increase, but at a much lower effort than described in Alternatives 2 and 3. NMDGF and NMDA could increase their efforts to respond to predator problems. However, the impacts of private persons implementing PDM would be similar to those described in Alternatives 2 and 3. Additionally, this alternative is not supported by USDA (1997) and WS Directive 2.101, which addresses WS's policy for applying IWDM. Under this alternative, WS take of nontarget animals would probably be a little less than that of the current program because no preventive lethal PDM actions would be taken by WS, but higher by private individuals. Measures to avoid T&E impacts were described in Chapter 3 and they would insure that adverse impacts are not likely to occur to T&E species by implementing Alternative 4. Aerial hunting activities would be less even though private persons could obtain aerial hunting permits from NMDGF, but minimal impacts would occur as described in section 4.2.1.2.

4.2.2.5 Alternative 5 - Corrective Control Only When Lethal PDM Methods are Used. Alternative 5 would not allow WS to conduct preventive operational PDM. Therefore, WS would not have any direct impact on nontarget or T&E species, or wildlife with aerial hunting overflights when this would be implemented. Although technical support might lead to more selective use of PDM methods by private parties than that which could occur under Alternative 2, private efforts to reduce or prevent depredations could result in less experienced persons implementing PDM methods leading to greater take of nontarget wildlife and T&E species as discussed in section 4.2.2.2. This alternative would have the potential for increased adverse impacts resulting from WS not providing quality PDM and the compensatory actions of private individuals. Presumably, many service recipients would become frustrated with WS's failure to resolve their wildlife damage, and would turn somewhere else for assistance. Higher variability in the level and scope of PDM activities could occur without a full IWDM program, and this could have a greater negative effect on some local wildlife species, including T&E species. Efforts to protect wildlife from predation could not be done because most of this work is done preventively. For example, the removal of predators from an area prior to the release of black-footed ferrets could not be done under this alternative and, therefore, could have an impact on the ferrets if New Mexico were considered for reintroduction. Aerial hunting activities would not be used by WS, but could be by the private sector, NMDA, or NMDGF. Even if NMDGF issued several more aerial hunting permits, the effects of low level flights from aerial hunting on wildlife would likely be similar to those discussed in section 4.2.1.2, barring illegal activities.

For many individual damage situations, this alternative would be similar to the Current Program Alternative because many producers do not contact WS until damage has already occurred or nonlethal methods are already being attempted by the landowners. In addition, WS often does not conduct proactive control for many of the predator species because of the relatively low occurrence of damage. WS conducts preventive control for species such as coyotes and red fox where the area has had historic damage. Without WS conducting proactive PDM activities, it is likely that private efforts at proactive PDM would increase. These increased private PDM activities would lead to potentially similar cumulative impacts as those described under the no program, Alternative 2. Impacts and hypothetical risks from illegal chemical toxicant use under this alternative would probably be the same as those under Alternatives 2 and 3. Therefore, it is concluded that more nontargets could be taken under this alternative than under Alternative 1, the Current Program Alternative.

4.2.3 Impacts on Public Safety, Pets, and the Environment

4.2.3.1 Alternative 1 - Continue the Current Federal PDM Program. The use of PDM methods by WS do not pose a significant potential hazard to the WS employees themselves or the public because all methods and materials are consistently used in a manner known to be safe to the user and the public. A detailed risk assessment analyzed all PDM methods used by WS for their impacts on public safety and found low level risks associated with only a few of them (USDA 1997, Appendix P). This assessment included potential risks to WS employees, the public, and nontarget animals including pets. While some of the materials and methods used by WS have the potential to represent a threat to health and safety if used improperly, problems associated with their mis-use have rarely occurred. This favorable record is due to training and certification programs for the use of PDM methods such as the M-44 (NMDA tests applicators), firearms (mandatory firearms training every 2 years - WS Directive 2.615), and aviation safety (pilot and gunner training). The proper use and safety of PDM methods is stressed to WS personnel, and many PDM methods have mandatory compliance associated with their use such as pesticide labels. The risk to the public is further reduced

because most WS PDM methods are used mostly in areas where public access is limited. Additionally, warning signs are prominently posted to alert the public when and where, the general area, toxic devices or traps are deployed. WS coordinates with cooperators or landowners about where and when PDM methods are to be used, thereby decreasing the likelihood of conflicts with the public. The issue of safety was discussed in 2.2.3 and WS's SOPs were addressed in section 3.4.2.3.

From FY00 to FY04, WS did use firearms, leghold traps, and chemical pesticides (M-44s, LPCs, and large gas cartridges). During this time an annual average of almost 2,400 sodium cyanide capsules were discharged in the M-44s, 2 bladders containing sodium fluoroacetate were punctured, and 2 gas cartridges were used. This is fairly low use of these chemicals. No incidents were recorded during this time with the public or WS personnel. All chemicals were used according to EPA label requirements.

Impacts on public safety and environment would not be different than under the previous EAs (WS 1997a, b, c) since WS's SOPs to protect the public and environment would be the same as under the current statewide EA. However, even considering this, WS would have minimal, if any, effects on public safety and the same positive effects as far as protecting public safety and property from predators of concern.

WS PDM activities are also not likely to negatively effect the public in terms of "Environmental Justice" and "Executive Order 12898" (see section 1.5.2). "Environmental Justice" and "Executive Order 12898" relates to the fair treatment of people of all races, income and culture with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is a priority within USDA, APHIS, and WS. Also, all APHIS-WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to ensure Environmental Justice.

Under the Current Program Alternative, PDM methods could be used to resolve complaints involving predators that represent a risk to public health and safety. Recent projects involving predators that represented a human health and safety risk, such as those described in 2.2.3, are effectively resolved using PDM methods such as traps and firearms.

Potential Effects from Aerial Hunting to WS Personnel, Public Safety, and the Environment. The following discussion relates to concerns about the potential for aircraft accidents (associated with WS's aerial hunting operations) causing catastrophic ground fires and pollution as a result of spilled fuel and oil. Information was obtained from Mr. Norm Wiemeyer, Chief, Denver Field Office of the National Transportation Safety Board (the agency that investigates aviation accidents).

Major Ground or Forest Fires. Mr. Wiemeyer stated he had no recollection of any major fires caused by any government aircraft since he has been in his position beginning in 1987. In addition, there are no reports of fires caused by WS aircraft in New Mexico or any other state. The period of greatest fire danger typically occurs during the summer months, but WS ordinarily conducts few, if any, aerial hunting operations during the summer months.

Fuel Spills and Environmental Hazard from Aviation Accidents. The National Transportation Safety Board stated that aviation fuel is extremely volatile and will evaporate within a few hours or less to the point that even its odor cannot be detected (N. Wiemeyer, the National Transportation Safety Board, pers. comm., 2000). Jet-A fuel also does not pose a large environmental problem if spilled.

This is because Jet-A is a straight chained hydrocarbon with little benzene present and microbes would quickly break-down any spill by aerobic action (J. Kuhn, Montana Department of Environmental Quality, pers. comm., 2001). The quantities potentially involved in aircraft used by WS are relatively small (52 gallon maximum in a fixed-wing aircraft and 91 gallon maximum in the helicopters used by WS), and during much of each flight the amount of fuel on board would be considerably less than these maximum amounts. In some cases, not all of the fuel would be spilled. Thus, there should be little environmental hazard from unignited fuel spills.

Oil and Other Fluid Spills. For privately owned aircraft, the aircraft owner or an insurance company is responsible for clean-up of spilled oils and other fluids if required by the owner or manager of the property where the accident occurred. In the case of BLM, USFS, and National Park Service lands, the land managing agency generally requires soil to be decontaminated or removed and properly disposed. With the size of aircraft used by WS, the quantities of oil capable of being spilled in any accident are small (i.e., 6-8 quarts maximum for reciprocating (piston) engines and 3-5 quarts for turbine engines) and insignificant with respect to the potential for environmental damage. Aircraft used by WS are single engine models, so the greatest potential amount of oil that could be spilled in one accident would be about 8 quarts.

Petroleum Biodegradation. Petroleum products degrade through volatilization and bacterial action, particularly when exposed to oxygen (EPA 2000). Thus, small quantity oil spills on surface soils are expec ted to biodegrade readily. Even in subsurface contamination situations involving underground storage facilities which would generally be expected to involve larger quantities than would ever be involved in a small aircraft accident, EPA guidelines provide for "natural attenuation" or volatilization and biodegradation in some situations to mitigate environmental hazards (EPA 2000). Thus, even where oil spills in small aircraft accidents are not cleaned up, the oil does not persist in the environment or persists in such small quantities that there is no problem. Also, WS's accidents generally would occur in remote areas away from human habitation and drinking water supplies. Thus, the risk to drinking water appears to be exceedingly low or nonexistent.

Human Safety Consequences of Aerial Hunting Accidents. Beyond environmental consequences, there are other issues related to aviation accidents, including the loss of aircraft and risks to the public and crew members. WS use of aerial hunting should be recognized for its divergence from any other aircraft uses found in General Aviation (GA). In addition, WS has implemented an Aviation Safety Program to support aerial activities and recognizes that an aggressive overall safety and training program is the best investment in accident prevention. While the goal of the aviation safety program is no accidents (L. Burraston, WS 2005 pers. comm.), accidents may still possibly occur, especially those involving mechanical failure. Because of the remote locations in which WS conducts aerial operations, the risk to the public from aviation operations or accidents is extremely minimal. Additionally, Federal aviation regulations require pilots to fly a minimum distance of 500 feet from structures and people. WS employees are trained in hazard recognition and shooting is only conducted in safe environments. The environment in which WS operates for aerial hunting is a higher risk environment than that for GA. Low level flights introduce additional hazards such as powerlines and trees. Additionally, the safety margin for error during maneuvers inherent at higher altitude is diminished during aerial hunting operations. Still, WS agency pilots and contractors are highly skilled pilots with commercial pilot ratings who have passed proficiency tests in the flight

environment encountered by WS.

In 1998, WS commissioned an independent review of its aerial hunting operations as a result of several accidents. An independent panel reviewed aerial hunting and made several recommendations regarding enhanced safety. These recommendations have been implemented by WS and were mostly implemented by the year 2001. Because accidents have been a concern to the public, they will be analyzed. Accidents included in this analysis include those that have occurred since 1996, and some were before the implementation of the review panel recommendations. However, in the interest of public disclosure, all accidents since 1996 are included in this analysis and shown in Table 17. The aviation industry standard for expression of accidents is the number of accidents per 100,000 hours flown. Because New Mexico WS flies a low number of hours annually (ave. 523 hrs/year from FY00 to FY04), it is statistically incorrect to analyze accidents on a statewide basis. An appropriate analysis of accidents would be at the national level for predator hunting activities of WS. At the national level, WS hours flown annually have ranged from 13,000 to as many as 19,000, and totaled about 130,000 hours in the 9 year period depicted in Table 17. Therefore, although still relatively low compared to GA, national level data provide a more appropriate statistical basis for comparison.

WS nationwide, including some non-low-level flying, had an accident rate of 10.8/100,000 compared to an accident rate of 6.9/100,000 for GA. However, the difference between the WS accident rate and GA accident rate is statistically insignificant (p=0.19, J. Shivik, WS-National Wildlife Research Center, 2005, pers. comm.).WS in the Western Region had an overall accident rate of about 12.1/100,000 (Table 17). Analyzed separately, WS agency pilots with agency-owned and rented aircraft had an accident rate of 6.2/100,000 hours, but contract pilots with their own aircraft have an accident rate of 51.7/100,000 hours. To put these into perspective, GA had an accident rate during the same time of 6.9/100,000 hours. The Department of Interior flies about 100,000 hours annually with a smaller proportion of low-level flying than WS and had an accident rate average of about 8.5/100,000 hours (National Business Center 2004). GA has 4 categories of aviation including personal/business, aerial chemical application (e.g., crop-dusting) and herding (ranching activities), instructional, and corporate; from 1990-1999 GA had an accident rate of about 8/100,000 (the accident rate is lower now as it dropped below 8 in 1996 and has remained below that since. Of this, aerial application (crop dusting) which is low level flying had a little over 9/100,000 hours and personal/business had the highest with about 11/100,000. Corporate aviation had the lowest accident rate at less than 1/100,000 hours (National Transportation Safety Board 2003) which is expected because this category involves larger planes, jets and turboprops associated with high-altitude flying.

Some of WS's accidents have involved pilot error while others are directly related to mechanical failure. Of the accidents between 1996 and 2004, 11 were from pilot error, 6 were from a mechanical failure, and 1 unknown. WS built the WS Aviation Training Center with the goal of reducing pilot error accidents to zero with an increase in pilot safety. Additionally, pilots are being trained better to deal with different types of mechanical failures. WS maintains compliance with all Federal Aviation Administration issued Service Bulletins, Airworthiness Directives, aircraft manufacturing recalls, and similar documents. However, these may not be distributed by the Federal Aviation Administration in a timely manner after a mechanical problem or concern has been identified. WS has been responsible for identifying to the Federal Aviation Administration 2 discrepancies (identified aircraft problems) of which 1 was issued to the public in an Airworthiness

Directive involving turbine engines.

Table 17. WS aerial hunting hours in the WS Western Region, WS accidents for 1996-2004 and general aviation (GA) hours and accidents for 1996-2003.

WS Aviation Accidents Compared to General Aviation						
Year	WS Hours Flown	WS Accidents	CP Hrs Flown	CP Accidents	GA Hours	GA Accidents
1996	14,999	1	1,282	1	24,881,000	1,908
1997	18,953	0	921	1 (1H)	25,591,000	1,845
1998	15,910	1	1,182	3 (3H)	25,518,000	1,904
1999	16,072	0	884	1	29,246,000	1,905
2000	11,836	1	3,688	2 (1H)	27,838,000	1,837
2001	13,190	0	3,149	1 (1H)	25,431,000	1,726
2002	12,991	1	2,635	0	25,545,000	1,713
2003	12,573	2 (1H)	2,834	1	25,800,000	1,732
2004	13,199	2	2,781	0	Not Available	Not Available
Total	129,723	8 (1H)	19,356	10 (6H)	209,850,000	14,570
Accident Rate	6.2/100,000		51.7/100,000		6.9/100,000	
WS Acc. Rate	12.1/100,000					

CP - Contract Pilots for WS H - Helicopter

The goal of the WS aviation safety program is zero accidents to pilot error. The safety program includes regular training for pilots and gunners as well as enhanced pilot training and evaluation. The National Aviation Training Center is beginning to provide pilots with additional, more rigorous training including the use of simulators. Fixed-wing aircraft are used more often today than helicopters, and helicopters must have a turbine power. WS contract pilots are now being screened more thoroughly and are held to the same training standards as agency pilots which should reduce their accident rate. Additionally, WS is moving towards hiring more agency pilots because problems associated with contract pilots. The process of hiring contract pilots in prior years was to accept the lowest bid which is no longer the SOP. WS must certify the pilots prior to working for WS. The accidents between 1996 and 2004 involved 11 fixed-wing and 7 helicopters. Pilot error was involved in 11, and those are the focus of the training center. About half of the accidents (a few were unknowns) were caused because of mechanical failure and were not avoidable (many of the helicopter accidents involved hard landings as a result of lost power). Thus, accidents may still occur. Of the accidents, 4 WS employees and 2 contract pilots were killed in 4 of the accidents, half in helicopters and half in fixed-wing. The last fatality occurred in 2000, with a contract helicopter and the cause of the accident was unknown. The accidents have occurred in all phases of flight from take-off to landing with 7 occurring while aerial hunting, 7 while ferrying/surveying, and 4 at take-off or landing. Thus, 60% of the accidents were not as a result of aerial hunting maneuvers. WS concludes that the accident rate is within the norms of aviation. WS flight crews understand the risks involved.

Thus far, WS aerial hunting activities and associated accidents have not involved the general public. Risks are expected to remain low. Security measures have been taken to also reduce the risk of aircraft theft. Therefore, WS concludes that accidents involving WS aircraft are within the expected

norms and that WS would continue to strive to reduce these further, thereby minimizing potential risks to flight crews and the public.

For all of the reason given above, the risk of ground fires or fuel/oil pollution from aviation accidents is considered low. In addition, based on the history and experience of the program in aircraft accidents, it appears the risk of significant environmental damage from such accidents is exceedingly low. WS's aircraft accidents have never harmed anyone other than the individuals actually occupying the aircraft. The impacts to those employees that were injured or killed in aircraft accidents are certainly significant from their individual perspectives. But there has been no impact to overall public health and safety in regards to any injuries or harm to any other persons, or to any recreational activities, let alone a significant impact. Based on the above information and analysis, it is reasonable to conclude that WS's aerial hunting should not cause any significant adverse impacts to wildlife populations, the environment, and public and employee safety.

4.2.3.2 Alternative 2 - No Federal WS PDM. Under this alternative, WS nor any other federal agency would provide assistance with PDM and, therefore would not have any effect on predator populations. The federal portion of WS would have no effect on public safety, the environment, or "environmental justice and executive order 12898" issues under this alternative. NMDA and NMDGF would probably still provide some reduced level of PDM without federal supervision. Private efforts to reduce damage would likely increase. Compared to the Current Program Alternative, private individuals would likely have more significant negative effects on the environment and human safety. This would result from untrained and unlicenced individuals using PDM methods and toxicants, legal and illegal. As discussed in section 2.2.3, it is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could lead to unknown impacts on public safety. In addition, private individuals are not accountable and could conduct PDM legally or illegally. Of the alternatives, this one would have the greatest potential for negative impacts on public safety. pets, and the environment.

In addition to some of the problems noted above, the federal portion of WS would not be able to respond to predator complaints involving human health and safety. Depending on the level of effort from NMDGF, these could be responded to in a timely manner. Therefore, human health and safety problems associated with predators could increase, though, minimally, and either go unresolved or be handled by private individuals with similar risks described above.

NMDGF could still issue aerial hunting permits to the public. Risks of accidents would likely be greater because private pilots would not likely receive the same training to aerial hunt safely that WS pilots receive and low-level flying has inherent risks associated with it. As seen with the accident rates of non-agency pilots, it is expected that more accidents would occur under this alternative.

4.2.3.3 Alternative 3 - Technical Assistance Only. Under this alternative, WS would only provide advice or guidance on PDM techniques and methods, but would not conduct any direct operational PDM in attempting to assist in resolving damage complaints, and therefore, would not have any impact on public safety or the environment in New Mexico. This alternative would be almost identical to Alternative 2, except that those people assisted with technical assistance would be more apt to conduct PDM with less risks to the public than those persons not assisted. So this alternative would have slightly less negative consequences than Alternative 2, but more than Alternative 1.

4.2.3.4 Alternative 4 - Nonlethal Required before Lethal Control. This alternative would require that resource owners use nonlethal techniques prior to WS implementing lethal PDM methods to resolve a damage problem. Most PDM methods with the potential for negative impacts on the physical environment or public safety, such as chemical toxicants, traps, and snares, would not be used by WS under this alternative as much as under Alternative 1, and therefore WS would have less potential for impact on public and pet safety, and the environment. NMDA and NMDGF, though, could increase their response to complaints for private persons frustrated by WS's lack of appropriate resolution for a damage situation, and would still probably conduct lethal PDM, but at some reduced level compared to Alternative 2 and 3. Private persons could also increase their use of PDM methods that have inherent risks. As discussed in Alternative 2 and 3, many of these individuals would use PDM methods and registered toxicants incorrectly, or illegal toxicants and these could adversely impact the environment and public safety. In addition, traps, snares, and firearms used by novices could have more adverse effects on public safety and the environment as discussed in Alternative 2 and 3. WS nonlethal PDM activities would not be likely to have a negative effect on the public concerning "environmental justice and executive order 12898" issues. WS would be able to respond to predator complaints with lethal PDM for incidences involving human health and safety and, therefore, would have the same effect as under the Current Program Alternative. Because WS could not necessarily resolve problems in a timely manner, the effects under this alternative would be greater than the Current Program Alternative, but less than Alternatives 2 and 3. WS would not conduct as much aerial hunting under this alternative, so associated risks would be reduced; private entities may increase aerial hunting, and their risk would be higher than the Current Program Alternative. Thus, this alternative would have slightly higher negative impacts than Alternative 1, but less than Alternatives 2 and 3.

4.2.3.5 Alternative 5 - Corrective Control Only When Lethal PDM Methods are Used. Alternative 5 would not allow WS to conduct preventive operational PDM. Therefore, WS would not have any direct impact on public and pet health and safety, or the environment where WS would normally have conducted preventive PDM. Most preventive work in New Mexico by WS is focused on areas of historic loss of livestock to coyotes. Much of this work is conducted with aerial hunting and some PDM on the ground. Therefore, PDM may be implemented in these areas, including aerial hunting, by people with less experience than WS personnel, and have greater impacts on public and pet safety. However, many would get WS involved after damage had occurred, and therefore, it is believed that fewer would get to the point of frustration where they would use illegal methods. These increased private PDM activities would lead to potentially similar cumulative impacts as those described under Alternative 4, but somewhat less because WS would be fairly responsive to most damage situations. Impacts and hypothetical risks from illegal chemical toxicant use under this alternative would probably be similar to the proposed action, but slightly more. Therefore, it is concluded that public and pet safety, and the environment would be more at risk under this alternative, but much less than Alternatives 2 and 3, similar to 4, yet more than the proposed action, Alternative 1.

4.2.4 Effects of PDM, Especially Aerial Hunting Activities, on the Use of Public Lands for Recreation

Recreation encompasses a wide variety of outdoor entertainment in the form of consumptive and non-consumptive uses. Consumptive uses of public lands include hunting, fishing, and rock-hounding. Non-consumptive uses include activities such as bird watching, photography, camping, hiking, biking, rock climbing, winter sports, and water sports. Recreationists are members of the general public that use public lands for one of the above or other activities. Recreation on private lands is restricted by landowners and,

thus, should not be impacted as much as on public lands. PDM is conducted mostly for the protection of livestock on grazing allotments in these areas. These are typically away from high public-use areas.

4.2.4.1 Alternative 1 - Continue the Current Federal PDM Program. WS is aware that most concerns of recreationists about PDM centers around the perceived impacts on activities such as hunting, photography, wildlife viewing, and enjoyment of seclusion. The issue was discussed in section 2.2.4 and measures to assure minimal impacts were addressed in 3.4.2.4. WS has not had a significant effect on recreational opportunities on public lands. Impacts on recreation such as hunting and non-consumptive uses would be similar to the current program under the 3 EAs (WS 1997a, b, c) since PDM would be similar to that which was analyzed previously. Measures developed to reduce impacts to recreation resources under the current program would be similarly implemented. Under this alternative, though, WS would have consistent policies throughout the State. Impacts on SMAs would continue to be very minimal and has been done in response to livestock losses. WS abides by all laws, regulations, rules, and policies for the use of different PDM methods in SMAs as applicable. WS would receive input and advice from BLM and USFS for the AWP regarding PDM in SMAs, especially for concerns where the proposed PDM might possibly represent a conflict with RMPs and LRMPs.

Game and non-game wildlife populations are not significantly impacted by WS's take on public lands (Table 18) allowing hunters and trappers ample opportunities to pursue game. Recreationists interested in viewing and photography opportunities for wildlife also have ample areas in New Mexico that are suitable for seeing abundant wildlife and include those areas that WS has worked. WS PDM activities do not significantly impact animal populations, it does not remove a significant number of any one species as discussed in Section 4.2.1.1. In fact, WS activities could bolster particular populations of wildlife such as PDM focused for the protection of T&E species, thereby increasing opportunities as discussed in section 1.3.3.6.

Table 18. The number of target predators taken by WS on BLM and USFS lands in the 3 WS Districts in FY04.

All Animals Killed by WS in PDM on USFS and BLM Lands by WS									
Species	BLM Lands				USFS Lands				Total
	Albq. District	Las Cruces District	Roswell District	Total BLM	Albq. District	Las Cruces District	Roswell District	Total USFS	
Target Species									
Bobcat	-	5	30	35	-	-	-	0	35
Coyote	-	395	321	716	59	56	-	115	831
Cougar	-	1	7	8	-	1	-	1	9
Nontarget Species									
Nontarget*	-	1	3	4	-	-	-	0	4
Total	0	402	361	763	59	57	0	116	879

*Nontarget species included 1 each gray fox, swift fox, raccoon, and striped skunk

On Federal lands, WS coordinates with the land management agency through AWPs, or other agreement, and designates different work zones on maps to reduce potential problems. For example, high-use recreational areas are designated on maps associated with the AWP and WS does not set equipment within a ¼ mile of these areas. Furthermore, upland game and other high-use hunting areas are delineated by NMDGF, USFS, or BLM, and if WS works on them, PDM equipment is removed a week or more prior to the hunting season

as appropriate. WS does not conduct PDM in high-use recreational areas except for the purposes of human health and safety protection. High use recreation and other sensitive areas are identified at a site specific level in WS AWPs on maps, or as new damage situations arise in new areas. Human safety zones, planned control areas and restricted or coordinated control areas are identified through interagency coordination.

Furthermore, WS reduces conflicts with recreationists due to inherent features of PDM. WS conducts PDM on public lands almost entirely for grazing allotments with sheep and cattle. These areas are generally not used extensively by recreationists. Most recreational areas are set aside for that specific purpose and grazing is not allowed. The highest seasonal PDM activity for the protection of livestock coincides with lambing and calving which is mostly in the spring (calving can also be in the fall). During this time, aerial hunting is a method of choice because many of the grazing areas have poor access and driving conditions are usually limited by wet or snow covered roads. Many recreationists as well as WS Specialists do not have access to these public lands because of these limitations. In addition, WS currently averages only 5 and 3 minutes of flight time per square mile on BLM and USFS lands, respectively (Table 19). WS currently aerial hunts 6% of the BLM lands, 5% of the USFS lands, and none of the other public and tribal lands in New Mexico. Clearly, the amount of land not aerial hunted is much greater and WS only works a small portion of lands in New Mexico and only for a short duration. Most recreationists are totally unaware of the PDM actions and the quality of the outdoor experience is not disrupted. Thus, WS avoids significant effects on recreation and nonconsumptive uses.

Table 19. The number of hours spent aerial hunting different land classes in New Mexico.

Time Spent Aerial Hunting Different Land Classes in New Mexico from FY00 to FY04								
Fiscal Year	Private		BLM		USFS		Other	
	Acres	Hours	Acres	Hours	Acres	Hours	Acres	Hours
FY00	3,197,465	322	593,351	96	12,816	5	0	0
FY01	3,039,825	346	908,884	69	71,389	3	0	0
FY02	4,674,234	480	945,115	113	29,000	2	0	0
FY03	4,472,646	408	795,585	123	20,006	1	0	0
FY04	3,696,127	544	573,578	97	78,200	4	0	0
Ave.	3,816,059	420	763,303	100	42,282	3	0	0
min/mi^2	4		5		3		0	
All lands ave. min/mi^2	4							

WS recognizes that some persons interested in SMAs may feel that any PDM activities in these areas adversely affect their aesthetic and natural qualities, value, and the ecosystem. The different SMAs were discussed in Section 2.1.4. WS abides by the laws, regulations, and policies such as the Wilderness Act as enacted by the U.S. Congress to minimize any effect on the public, but conducts PDM as allowed to reduce damage in the SMAs. Many SMAs have had grazing long before being designated as such and PDM has been conducted on many of these, typically as long as grazing has been allowed. However, WS conducts PDM on only a few SMA grazing allotments for the protection of livestock. The Current Program Alternative does not have much of an impact on BLM WSAs, WAs, or recreation areas, and USFS WAs or other SMAs such as campgrounds, research natural areas, and trailheads, and National Conservation Areas. WS complies with WS guidelines and policies when conducting PDM in these areas. Current laws and regulations allow the public and WS to conduct PDM activities in SMAs under certain limitations. In the

last two FYs, WS did not conduct PDM on any SMAs, but potentially could.

Sections 2.2.4 and 3.4.2.4 discuss the issue of WS PDM activity in SMAs, such as WAs and WSAs, and measures that help to ensure no effects in SMAs. PDM is only conducted in designated WAs or WSAs when allowed by the legislation that designated the WA, or under regulations and policies developed by USFS or BLM for PDM in these areas. PDM in SMAs is a very minor component of the current program. Currently, private individuals using firearms and trail hounds can sport hunt or conduct PDM in most WAs and WSAs. These activities are not restricted and are allowed by BLM, USFS, or NMDGF regulations. To impose special restrictions on PDM for professional WS personnel involving similar types of methods in SMAs would be arbitrary and inconsistent with legislation.

4.2.4.2 Alternative 2 - No Federal WS PDM. Under this alternative, WS nor any other federal agency would provide assistance with PDM and, therefore would not have any effect on recreation. The federal portion of WS would not have any impact on hunting, trapping, and nonconsumptive uses. NMDA and NMDGF would probably provide some level of direct assistance with PDM. The State PDM would have similar effects on recreation as described under the Current Program Alternative, except that with no federal portion, effects would be decreased proportionately to the decreased effort. Private efforts to reduce or prevent depredations would likely increase which could result in less experienced persons implementing PDM methods leading to a greater effect on recreation than described under the Current Program Alternative. As discussed with other issues, it is hypothetically possible that the frustration caused by the inability of novice PDM persons to reduce losses could lead to the illegal use of chemical toxicants which could impact recreationists and their pets. This activity could also have impacts on game species, as described for predators in 4.2.1.2 and nontarget species in 4.2.2.2, but it is not likely to impact these species greatly. Aerial hunting would probably not be used as much under this alternative because it requires pilots with experience at low level flying and a permit from NMDGF, and therefore, recreationists would be effected minimally with this PDM method. Even if NMDGF issued several more permits, the effects would likely be similar to those in section 4.2.4.1, barring illegal activities. PDM activities would probably cause damage to the environment from off-road vehicle use where WS would normally aerial hunt. This is because much of the environment is sensitive to disturbance and vehicles often leave long-lasting scars, especially when vehicles are used during the wet season because ruts are made. These scars can be an eyesore to recreationists. Therefore, it is likely that some negative impacts could occur under this alternative which are more than the current program, as discussed in section 4.2.4.1.

The current program has been determined to have minimal impacts on SMAs, so the same program reduced by the federal component would similarly not effect SMAs. Without a federal program to provide assistance, individuals affected by predator damages could conceivably have a negative effect on SMAs for reasons described under this alternative elsewhere. Therefore, this alternative would likely have more negative effects on SMAs than the Current Program Alternative.

4.2.4.3 Alternative 3 - Technical Assistance Only. Under this alternative, WS would only provide advice or guidance on PDM techniques and methods, but would not conduct any direct operational PDM in attempting to assist in resolving damage complaints, and therefore, would not have any impact on recreational use of public lands in New Mexico. This alternative would cause much of the same problems discussed in Section 4.2.4.2, except that it would be at a reduced level because those people receiving advice could make wiser choices in conducting PDM on public lands. However, this alternative would cause

slightly higher negative impacts on recreation than the proposed action. Impacts to SMAs would likely be minimal, but would likely be more than the Current Program Alternative.

4.2.4.4 Alternative 4 - Nonlethal Required before Lethal Control. WS would minimally affect recreationists with the Nonlethal before Lethal PDM Alternative. In areas where nonlethal PDM had already been implemented and found to be unsatisfactory, the full array of PDM methods could be used and their effects were considered minimal as discussed in section 4.2.4.1. However, some individuals would implement lethal PDM on their own because WS might seem unresponsive. This could have adverse effects on recreationists as discussed under Alternatives 2. However, the effects on recreation would probably be less than this alternative, but more than the effects discussed for Alternative 1. Impacts on SMAs under this alternative would be similar to the current program, Alternative 1; although the effectiveness may not be as high as the current program, this alternative would allow the use of all methods eventually. Some producers may cause problems similar in SMAs to Alternatives 2 and 3, but at a much reduced rate since coordinated assistance would still be available.

4.2.4.5 Alternative 5 - Corrective Control Only When Lethal PDM Methods are Used. WS would minimally affect recreationists with the Corrective Control Only Alternative with similar affects as Alternative 1. In areas where preventive PDM would have been used by WS under Alternative 1, some resource owners would possibly implement them; preventive PDM has been found effective in reducing damage and the amount of PDM conducted later. Some resource owners implementing PDM could have an effect on recreationists, but this would be minimal compared to the Alternatives 2 and 3 because preventive PDM would only be used in Alternative 1 for situations where it has been found effective over preventing damage from occurring with nonlethal methods. The most typical method that would be prevented from being used would be aerial hunting coyotes prior to lambing and calving. Much more effort would be expended following losses with PDM on the ground and aerially, and more losses would be incurred by the resource owner as has been shown (Wagner 1997, Wagner and Conover 1997). Resource owners conducting their own preventive PDM would have similar impacts as those described under Alternatives 2 and 3.

4.3 SUMMARY AND CONCLUSION

The current program had the lowest overall negative environmental consequences combined with the highest positive effects, and is, therefore, the preferred alternative (Table 20). The environmental impacts of implementing PDM correspond with those raised and discussed in detail in Chapter 4 of USDA (1997). Impacts associated with activities under consideration here are not expected to be "significant." Based on experience, impacts of the PDM methods and strategies considered in this document are very limited in nature. The addition of those impacts to other impacts associated with past, present, and reasonably foreseeable future actions, as described in USDA (1997), would not result in cumulatively significant environmental impacts. Monitoring the impacts of the program on the populations of both target and nontarget species would continue. All PDM activities that may take place would comply with relevant laws, regulations, policies, orders, and procedures, including the ESA, Migratory Bird Treaty Act, and FIFRA. This EA will remain valid until WS and other appropriate agencies determine that new actions or new alternatives having substantially different environmental effects must be analyzed. Change in environmental policies, the scope of the project, or other issues may trigger the need for additional NEPA compliance. This EA will be reviewed annually for its continued validity.

Table 20. A summary of the environmental consequences of each program alternative relative to each issue.

Comparison of the Overall Effects on Issues Under the Alternatives						
Issue No.	Issues/ WS Impacts	Alternative 1 Current Program	Alternative 2 No Federal Program	Alternative 3 Nonlethal	Alternative 4 Nonlethal before Lethal	Alternative 5 Corrective Control Only
1	Coyote	0	0	0	0	0
	Cougar	0	-	-	0	0
	Bobcat	0	0	0	0	0
	Striped Skunk	0	0	0	0	0
	Black Bear	0	-	-	0	0
	Other	0	-	-	0	0
2	Non-target Species	0	-/0	-/0	0	0
	T/E Species	-/+ +	- -/0	- -/0	-/+	-/0
	Aerial Overflights	0	0	0	0	0
3	Public safety	-/+	- -	- -	-	-
4	Recreation	0	- -	- -	-	0
	Sp. Mgmt. Areas	0	- -	- -	-	0

Summery ratings of impacts: "- -" = High Negative; "-" = Low Negative; "0" = None; "+" = Low Positive; and "++" = High positive.

Note: While a control action or removal might have a negative effect on that individual animal or issue, removing the individual predator could also have a positive effect on it's prey species.

CHAPTER 5 - LIST OF PREPARERS AND PERSONS CONSULTED

5.1 LIST OF PREPARERS

Thomas Hall, USDA-APHIS-WS, Wildlife Biologist/Environmental Coordinator, Ft. Collins, CO

Alex Lara, USDA-APHIS-WS Supervisory Wildlife Biologist/State Director, Albuquerque, NM

Alan May, USDA-APHIS-WS, Supervisory Wildlife Biologist/Asst. State Director, Albuquerque, NM

Brian Archuleta, USDA-APHIS-WS, Wildlife Biologist/District Supervisor, Roswell, NM

Kenneth Podborny, USDA-APHIS-WS, Wildlife Biologist/District Supervisor, Albuquerque, NM

Keel Price, USDA-APHIS-WS, Wildlife Biologist/District Supervisor, Las Cruces, NM

5.2 LIST OF PERSONS OR AGENCIES CONSULTED??

State of New Mexico

New Mexico Department of Agriculture

New Mexico Department of Gams and Fish

U.S. Department of Agriculture

Forest Service

U.S. Department of Interior

Bureau of Land Management

Fish and Wildlife Service

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